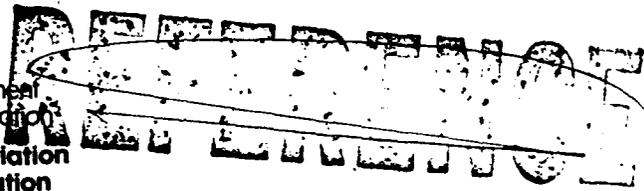




U.S. Department of Transportation  
Federal Aviation Administration



# Rotorcraft Master Plan

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September 1987

Associate Administrator  
for Aviation Standards  
Office of Airworthiness

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**ROTORCRAFT MASTER PLAN**

FOREWORD

The Federal Aviation Administration developed the Rotorcraft Master Plan to contribute to a climate in which industry can continue to expand and realize the full potential of rotorcraft in meeting the nation's transportation needs. This plan addresses all aspects of rotorcraft requirements through the year 2000 in the areas of certification, heliports, and the National Airspace System (NAS). It is designed to interface with the NAS Plan and other planning documents that will guide agency actions for the remainder of the 20th century.

The Associate Administrator for Aviation Standards was assigned responsibility for originating and managing the Rotorcraft Master Plan in view of some key rotorcraft programs, expertise, and resources available in this area. Now that these programs are underway, the Rotorcraft Master Plan is essentially a long-range planning and integrating effort.

Therefore, effective with the issuance with this 1987 update of the Rotorcraft Master Plan, the Associate Administrator for Policy and International Aviation is responsible for management, coordination, and oversight of the plan.

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# **EXECUTIVE SUMMARY**

## EXECUTIVE SUMMARY

Rotorcraft are unique in operating capability and system requirements. Special attention must be given to the development and implementation of rotorcraft procedures, operating sites, and the certification process. In the past decade, the use of the helicopter has increased significantly. Although in recent years, there has been a considerable slowing of this growth with the overall decline of the economy. Demand for the unique capabilities offered by rotorcraft in both traditional and new roles has been spurred by improvements in productivity, design, materials, reliability, engines, and instrument flight rules (IFR) capability.

The Federal Aviation Administration (FAA) can help provide a climate in which industry can continue to expand and realize the full potential of rotorcraft in meeting the nation's transportation needs. Toward this end, the Rotorcraft Master Plan has been developed for long-term action over the next 2 decades.

The goals of this plan are to enhance the National Airspace System (NAS) to permit rotorcraft to employ their unique capabilities to the maximum extent, to provide for an adequate system of visual flight rules/instrument flight rules (VFR/IFR) heliports, and to improve safety by upgrading criteria and applying advanced technology.

Some of the significant events that have occurred toward realizing these goals since publication of the last Rotorcraft Master Plan include:

1. Rotorcraft Regulatory Review No. 5 (Operations and Maintenance) final rule was published in the Federal Register on November 7, 1986, with an effective date of January 6, 1987.
2. Issued an Instrument Flight notice of proposed rulemaking (NPRM) proposing a method of reduction of approved instrument approach speed. A public meeting was held in March 1987 to discuss the proposal.
3. A public meeting with participation of domestic and foreign manufacturers and foreign airworthiness authorities was held April 30 through May 2, 1986, to discuss the 92 European Airworthiness Authorities Steering Committee (AASC) proposals for Part 29 of the Federal Aviation Regulations (FAR). The consensus of the meeting was that 22 of the proposals have merit for publication as NPRM's. The four projects by specialty area have been combined into one NPRM, including all 22 proposals. Also, it was agreed that 16 of the AASC proposals would be best handled as changes or additions to Advisory Circular 29-2, Certification of Transportation Category Rotorcraft.
4. Awarded a contract (5-year period of performance, with a \$5 million ceiling) for support of the helicopter program over the full range of the development and logistics (ADL) portion of the Rotorcraft Master Plan.

5. The National Concept Development Heliport at the FAA Technical Center in Atlantic City, New Jersey, was dedicated on June 12, 1987. New technologies in heliport approach aids, procedures, communications, and lighting will be evaluated there and at the National Prototype Demonstration Heliports.

Special needs for rotorcraft are described in projects throughout this plan. Programs identified are specifically directed to rotorcraft, but an attempt is also made to identify other agency efforts which could either have an impact on rotorcraft or provide a benefit. The fixed-wing segment of the industry will benefit from improvements provided for rotorcraft. IFR reliever heliports and supporting routes will serve to increase system capacities. Major carrier and regional carrier industries are very likely to benefit from growing rotorcraft operations, similar to the way major carrier business has been enhanced by the growth of fixed-wing hub commuters and air taxis. The advantage of using a helicopter is, of course, its ability to operate into the very heart of an urban area.

Particular attention is focused on efforts to allow increased capability for safe rotorcraft operations in adverse weather conditions. For example, this plan contains projects dealing with research and certification of rotorcraft in IFR, icing, and snow conditions, as well as improved weather information, enhanced NAS capability for IFR operation, and development of IFR heliport capability.

This plan addresses all aspects of rotorcraft requirements through the year 2000 in the areas of certification, heliports, and the NAS. It is designed to interface with the NAS Plan and other planning documents that will guide agency actions for the remainder of the 20th century.

The Rotorcraft Master Plan is unique in that it is structured to address rotorcraft needs. Efforts residing in functional organizations of the FAA have been collectively directed toward a common set of agency rotorcraft goals. This process has also helped to establish interrelationships between functional activities for a comprehensive rotorcraft program. The roles of industry, NASA, DOD, and other elements of the rotorcraft community have been addressed in addition to FAA efforts. Close coordination and continued cooperation among all parties will be necessary to reap maximum benefit from this plan in the shortest possible time. Relationships currently existing between the manufacturing industry and other elements of the rotorcraft community suggest that such a cooperative climate is feasible.

Earlier versions of this plan have been given wide distribution and review within the FAA, other interested government organizations, and the rotorcraft industry. Briefings on this plan have been provided at national and international rotorcraft meetings and symposiums. A meeting was held with rotorcraft industry representatives June 28 through 30, 1983, specifically to obtain indepth industry comments and recommendations on this plan. Those

industry recommendations and comments, as well as the most current FAA program and project information, have been incorporated in this plan to the maximum extent feasible.

The FAA FY-87 Objectives dated August 1, 1986, require that the agency "...6. Develop/implement/revise FY-87 portions and, consistent with available funding, achieve 90 percent of the published milestones for the following plans: ...-Rotorcraft Master Plan...." Keeping this objective in mind, particular effort has been taken in this version of the plan to assist the reader in assessing progress and bridging any gap between this and previous editions of the plan by:

- o Explaining program/project slippages and accelerations.
- o Explaining evolution and changes in projects.
- o Noting new and completed programs and projects.

Programs and projects are of two general types: those which encompass a definite timeframe for completion and those which are of a long-term, continuing nature and require the resources of FAA personnel on a day-to-day basis. The long-term, continuing programs and projects are identified by an asterisk on the index of programs/projects at the beginning of each chapter.

Finally, this plan advocates emphasis on the FAA role of "fostering aviation" for rotorcraft. Fostering activities in the public sector should include those similar to fixed-wing programs undertaken during the early years of air transportation.

**OVERVIEW AND ILLUSTRATIONS**

## OVERVIEW

### Introduction.

Rotorcraft provide another dimension to air travel because they can operate from confined and unimproved areas and because they have a unique capability to maneuver at low airspeeds. In recent years, use of the helicopter has consistently increased. New uses and expansion of existing uses over the past decade prompted by improvements in helicopter design and capabilities have made the helicopter industry one of the fastest growing segments of civil aviation.

In 1985, the U.S. active civil helicopter fleet numbered approximately 7,904, over half of which were turbine-powered machines. An additional 7,404 rotorcraft comprised the military fleet in the continental United States in 1985. U.S. helicopter manufacturers produced 376 helicopters valued in excess of \$505 million in 1985. Approximately 42 percent of these units were exported (Figure 1).

There are more than 2,481 civil helicopter operators in the United States, Canada, Mexico, and Puerto Rico. Of this total, 46 percent were engaged in commercial ventures (using 67% of the civil helicopters) with the remainder being engaged in corporate/executive and civilian Government activities (Figure 2).

There are over 4,000 heliports and helistops in the United States and Canada, with the greatest geographic concentrations in the East, North Central, Central, Middle Atlantic, South, Pacific, and West (Figure 3).

Currently, despite a marginal economic climate, helicopter growth is expected to continue, although at a reduced-rate than in recent years. By 1995, the active fleet is expected to number approximately 8,300 rotorcraft (Figure 6). (Please Note: Data presented are for January 1 of the year indicated.) Figure 4 shows past and future projections in helicopter growth rate. The helicopter is in about the same stage of maturity and use that general aviation airplanes and commercial transports were when they experienced rapid expansion in usage and sales. This historical trend further emphasizes the need for the Federal Aviation Administration (FAA) to be prepared to accommodate future growth of rotorcraft. Forecasts indicate that before the turn of the century, city-center to city-center rotorcraft operations will be commonplace. Of the total estimated number of machines forecast to comprise the civil fleet at the close of this century, half are expected to be equipped for instrument flight rules (IFR) flight capability.

Although rotorcraft represent an important segment of the aviation system, today's environment is characterized by a system in which helicopters are newcomers—a system that was not designed to accommodate the special needs and capabilities of rotorcraft. Rotorcraft operations are significantly different from conventional fixed-wing operations. Rotorcraft operate offshore, in mountainous areas and in high density metropolitan areas—locations where navigation aids, communication, and radar coverage are not necessarily optimum for fixed-wing operations. Rotorcraft operations in high-density traffic areas add to the congestion of instrument approach facilities unless traffic flow management takes advantage of rotorcraft maneuverability and freedom from runway requirements. Although use of the air traffic control system for rotorcraft instrument flight enhances safety, procedures used in today's system tend to force the rotorcraft into a mold designed for fixed-wing operations.

## Background.

To deal with the unprecedented growth in the helicopter industry, the FAA Helicopter Operations Task Force (HOTF) was established in April of 1975. At that time, its sole purpose was to assist the industry in addressing problems associated with low-altitude IFR operations in offshore airspace adjacent to the contiguous States and Alaska. Over the past 10 years, task force responsibilities were greatly enlarged to accommodate changes in FAA organizational structure and to address the expansion of worldwide helicopter operations. This expanded role prompted a name change in late-1981 to FAA Rotorcraft Task Force (ROTAF). The ROTAF was composed of a Chairperson and 15 FAA specialists, each an expert in his own field, from various disciplines within the FAA.

The ROTAF guided and monitored agency rotorcraft interests in the three areas: Operations, Policy, and R&D. The ROTAF systematically identified and prioritized various agency rotorcraft efforts to ensure that appropriate emphasis and direction were provided for each program. Although the task force functioned effectively within its mandate, as more and more worldwide rotorcraft activity was generated, the entire FAA program needed to be restructured to provide greater responsiveness to the industry. The FAA responded to these changing needs by formulating a long-term plan of action over the next 2 decades. That action plan is this Rotorcraft Master Plan. The ROTAF now functions as an FAA/industry forum, meeting every other month to discuss a variety of national rotorcraft topics. The ROTAF provides an effective means for open communication and critique of national rotorcraft issues.

## Goals.

The central goal of this plan is to enhance the National Airspace System over the next 2 decades to assure that the unique capabilities of rotorcraft are employed to the maximum practical extent, to provide for an adequate system of VFR/IFR heliports, and to improve safety by upgrading certification criteria and promoting the use of advanced technology wherever possible.

Specific goals include:

- o Maintaining or improving the current levels of U.S. aviation safety by application of up-to-date rotorcraft safety standards, procedures, guidance, and surveillance. The scope of these activities includes initial certification, modification, manufacturing, operation, and continued airworthiness. In all activities, safety must be the primary consideration.
- o Aggressively pursuing opportunities to reduce, eliminate, or otherwise improve the agency's regulatory burden by continued systematic review of the regulatory program. Emphasis is placed on establishing meaningful, enforceable rotorcraft standards, which allow maximum flexibility in compliance while maintaining an appropriate level of safety.

- o Improving the agency's preeminence as the world aviation authority by providing rotorcraft technical guidance in international aviation activities and maintaining modern airworthiness and operations standards. This is accomplished through participation in international conferences, training, and the national resource specialist program.
- o Continuing the organizational development efforts designed to standardize and centralize application of rotorcraft certification, rulemaking, policy, and guidance.
- o Improving efficiency and capacity of the National Airspace System by improved automated operations, considering the specific and unique requirements of rotorcraft.
- o Developing 25 major urban area heliport systems by the year 2000 and a complementary national helistop/heliport program.
- o Minimizing rotorcraft environmental impact on the national air transportation system, while implementing the agency's statutory mandates for environmental protection.
- o Providing an environment in the NAS in which rotorcraft may operate as fuel efficiently as practicable. Figure 5 shows that rotorcraft operations are projected to account for a meaningful portion of our overall aviation fuel usage.

#### Assumptions.

During the formulation of this plan, many premises were considered and, as a result, a number of assumptions reached.

These assumptions include:

- o Demand for all types of aviation services will grow significantly during the next 20 years.
- o The expanded use of both civilian and military helicopters through the year 2000 will require more creative integration of the rotorcraft into the NAS.
- o The demand for urban area rotorcraft operations will increase both within the major metropolitan areas and between them.
- o Growth in rotorcraft fleet size will continue although somewhat slower than in recent years (Figure 6). Approximately one-half of these will be IFR equipped.
- o Federal funds will continue to be available to assist communities in heliport planning and construction.

- o With the advent of new, sophisticated simulator technology, pilot training, proficiency checks, and pilot certification will use this capability more often.
- o Responsibilities for certification, rulemaking, policy, and guidance will remain as presently established between Washington headquarters and the Rotorcraft Certification Directorate.
- o Development of new rotorcraft and derivatives of existing types will continue at about the present rate. Practical advanced technology machines and rotorcraft with higher maximum certificated takeoff weight will be in service by the year 2000.
- o Increased use of larger rotorcraft in urban areas will require considerable research and development in rotorblade and engine noise reduction application. Until adequate sound suppression measures are implemented, heliport development will be inhibited at many locations.
- o By the year 2000, the air traffic control system will be highly automated, with the controller and the pilot exercising primarily a managerial monitoring and override function in the IFR environment.
- o The major U.S. navigation system will have a 3-dimensional capability en route and a 4-dimensional capability at certain high-density urban areas.
- o Helicopter corridors will be feasible between city centers, and the ATC system will provide for direct random routing at low altitudes.
- o Existing separation standards will be reduced. Better use of the available airspace will be possible with refined area navigation (RNAV) systems, data link cockpit displays, advanced telecommunications technology, including satellite, and continuous telemetering to relay aircraft position information.
- o FAA will aggressively pursue opportunities to reduce, eliminate, or otherwise improve the regulatory burden consistent with maintaining or improving safety.
- o With more inherent stability being built into new production rotorcraft, more IFR operations will be conducted on a routine basis, and the use of rotorcraft will substantially increase (Figure 7).
- o Few low-cost rotorcraft will be available for personal and recreational use; however, with the advent of the ultralight personal conveyance rotorcraft falling within the scope of FAR Part 103, there will be an impact on both the NAS and the aircraft and pilot certification process.
- o Increasing worldwide production of IFR-capable rotorcraft will create an increased demand for more instrument qualified pilots (Figure 8).

- o Increased use of rotorcraft through the year 2000 will create additional requirements that will impact the agency's economic and manpower resources in the future. Fiscal and personnel constraints will continue to be applied consistent with national economic recovery policies.

#### Synopsis and Structure of This Plan:

The Rotorcraft Master Plan addresses all aspects of rotorcraft requirements through the year 2000 in the areas of certification, heliports, and the NAS. It is designed to interface with the NAS Plan and other planning documents that will guide agency actions for the remainder of the 20th century.

This plan integrates the many diverse rotorcraft-related efforts, both within and interfacing with the FAA, into coordinated major thrusts (Figure 9) with specific goals (Figure 10). It also describes evolutionary targets (Figure 11) along the path toward achieving these goals. Symbology used in the plan is depicted in Figure 12.

Since the objective is to update the Rotorcraft Master Plan on a yearly basis, the resumes contained in the 1987 update have been entered into the automated resume system (ARS) which is a part of the aviation safety analysis system (ASAS) centered in Oklahoma City. Entering the resumes into the ARS will provide search capabilities (i.e., milestones, principal specialist, etc.) that were not previously possible with word processing equipment. Automating the Rotorcraft Master Plan resumes will also enable each responsible office, with access to ASAS, to update its resumes as changes occur. Keeping each project entry current will not only provide an efficient management tool but will also simplify updating the Rotorcraft Master Plan. Although the resumes appear in a slightly different layout than those in the May 1986 Rotorcraft Master Plan, they contain the same information. The resume numbering system has also been revised to permit entry of the resumes into the ARS. The new numbering system is described in a later part of this section.

The composition of this plan, in consonance with the overview, includes a sequence of three evolution diagrams (Figures 13, 16, and 18). These depict rotorcraft projects, programs, and ongoing efforts in each of three major areas: National Airspace System, Heliports, and Certification. All rotorcraft activities addressed in this plan are reflected in one or more of these major areas. This plan identifies a series of goals and milestones over the next 14 years. Achievement of these objectives will provide the basis for assuring that concise and systematic steps are taken to provide the optimum environment for rotorcraft as the year 2000 approaches.

A major effort is planned to enhance the NAS for rotorcraft (Figure 13). The availability and reliability of navigation, communication, and surveillance coverage at low altitudes currently tend to inhibit the efficient operation of rotorcraft. For example, the reduction in VOR coverage at low altitude is evident from a comparison of Figures 14 and 15.

Another important effort is planned in the heliports area (Figure 16). Within the heliports area, a joint FAA/industry program will lead to an establishment of design criteria and standards for heliports with full IFR precision approach capability (Figure 16). This systematic evolution will be accomplished through the efforts of joint FAA/industry coordination and working groups. Initial evaluation of new techniques and/or technologies will be carried out at the National Concept Development Heliport located at the Federal Aviation Administration Technical Center, Atlantic City, New Jersey. Field testing and/or further evaluation will be carried out at selected public-use heliports such as: Indianapolis, Indiana; New York, New York; or New Orleans, Louisiana. Additional public-use heliports are expected to be developed with funds from the Airport Improvement Program or successor programs. The FAA/Industry National Prototype Heliport Demonstration and Development Program (Figure 17) will provide an advanced demonstration of all-weather heliport capability using the most up-to-date equipment available.

This effort is in conjunction with industry and addresses the establishment of IFR heliport criteria and standards and facilities with full IFR precision approach capability between now and 1989. Although full IFR capability is not envisioned until the 1988-89 timeframe, case-by-case interim approvals of various new and existing technologies will provide for a systematic evolution from basic VFR configuration to IFR non-precision approach capability in 1987-88 and to full IFR precision approach capability in 1988-89. This systematic evolution will be accomplished through the efforts of joint FAA/industry coordination and working groups. Evaluation of new technologies will be accomplished at the National Concept Development Heliport at the FAA Technical Center in Atlantic City, New Jersey, which was dedicated on June 12, 1987, and at the National Prototype Demonstration Heliports. At the conclusion of successful testing and certification, new systems and equipment will be made available for installation and operational use at the National Prototype Demonstration Heliports. The FAA expects to support construction of the prototype heliports with funding through the Airport Improvement Fund (AIP).

The FAA has selected New York, NY; New Orleans, LA; Indianapolis, IN; and Los Angeles, CA, as sites for its National Prototype Demonstration Heliport Program. These facilities will be equipped with the most advanced technology flight aids, including the new generation microwave landing system (MLS) and automated weather observing systems (AWOS). Federal funding for the New Orleans heliport was approved, and the heliport was opened and commenced operation in January 1986. The New Orleans heliport is located adjacent to the Super Dome sports stadium. The Indianapolis Heliport became operational in May 1985. The New York City site is the present Wall Street heliport. It first opened in December 1960. Construction of the new facilities is nearly completed. The Los Angeles Heliport is expected to be located in downtown Los Angeles near Union Station.

Certification (Figure 18) is an important major effort encompassing type and airworthiness certification of rotorcraft, manufacturing and maintenance personnel, facility certification and surveillance, and operations (airman and operator certification and surveillance).

Each project depicted on the evolutionary diagrams (Figures 13, 16, and 18) is reflected on an expanded program and/or project sheet. The detailed description of the project includes its purpose and goals, nature of the problem, approach used, subtasks, program schedule, and related efforts. The detailed project descriptions are intended to be updated annually as funds are obligated and the program progresses.

Each program/project effort reflected on the evolution diagram includes a reference code. The first three digits of this code represent the element having primary responsibility for that effort as follows:

- AAT - Air Traffic
- AVS - Aviation Standards
- ASW - Rotorcraft Certification Directorate
- ARP - Airports
- API - Policy and International
- ADL - Development and Logistics

The first two numerical designators indicate the year in which the program or project was initiated. The second set of numerical designators indicate either a program or project. Generally, a program is a comprehensive or overall effort which may encompass several more detailed, related projects. Designators ending in zero indicate a program (010, 020, 030, etc.); all other numerical designators indicate a project within that program area. The letter (M) designates a program or project entered in the ARS for the Rotorcraft Master Plan. For example, AVS-82-024-M is an Aviation Standards project initiated in 1982 involving MLS collocated site criteria within the program area of Resume AVS-82-020-M, Instrument Enroute and Terminal Procedures (TERPS).

An index of the programs and projects appears at the beginning of Chapters 2 through 7. Appearing in the left-hand margin of each index page is an impact indicator that portrays where the thrust of a particular program/project is expected to have the greatest impact—in the area of National Airspace System (N), Heliports (H), or Certification (C).

Certain resumes in this plan are identified by an asterisk in the index at the beginning of each chapter. These are long-term, continuous efforts usually associated with basic responsibilities and functions of the agency and normally contain no identified milestones. These resumes have been in the plan since its inception. We are continuing to include them in the 1987 RMP to illustrate the agency's day-to-day commitment of resources and involvement with rotorcraft in addition to those rotorcraft projects with finite starting and end dates and measurable milestones.

This plan is unique in that it seeks to address the roles of industry, NASA, DOD, and other elements of the rotorcraft community in addition to FAA efforts. Close coordination and continued cooperation among all elements will be necessary to reap maximum benefits from this plan in the shortest possible time. Relationships currently existing with the industry and other elements of the rotorcraft community suggest that such a cooperative climate is feasible.

# **U.S. Rotorcraft Data**

**(United States, Canada, Mexico, and Puerto Rico)**

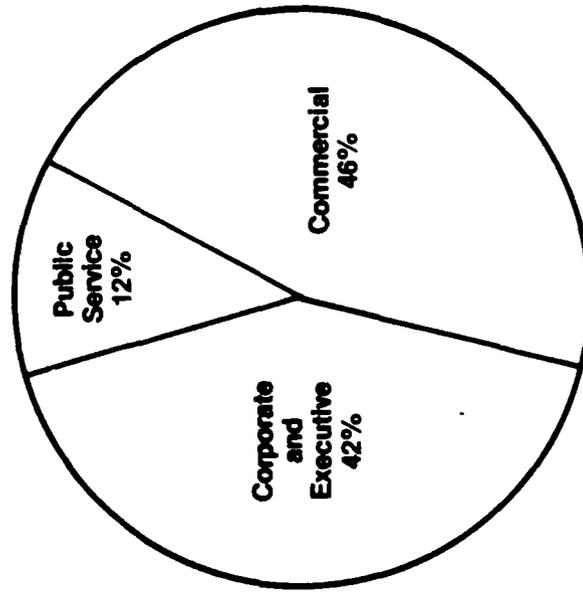
**1985**

- **Active Civil: 7,904**
- **Military (Continental U.S.): 7,404\***
- **1985 Production: 376**
- **1986 Production: 330**
- **Value: \$505 Million (1985 Production)**
- **Value: \$288 Million (1986 Production)**
- **Exports: 42% (Approximately)**
- **Operators: 2,481**
- **Heliports/Helistops  
(U.S., Canada, and Puerto Rico): 4,232**

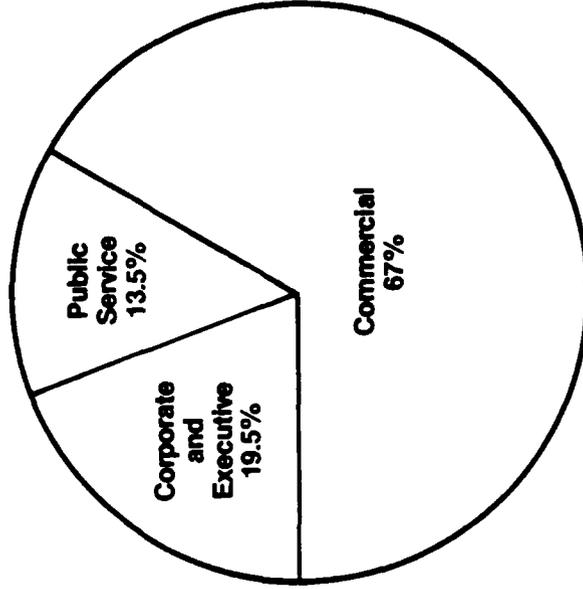
Source: Aerospace Facts and Figures 1986-1987 (Aerospace Industries Association of America, Inc.)

\*FAA Aviation Forecasts, Fiscal Years 1987-1998, February 1987 edition; FAA-APO-87-1 (Federal Aviation Administration)

# Helicopter Operator and Helicopter Distribution by Primary Mission



Distribution of Civil Helicopter Operators by Primary Mission



Distribution of Civil Helicopters (No. of Aircraft) by Primary Mission

Source: Aerospace Facts and Figures 1966-1967 (AIA)

Figure 2



# Estimated Industry Growth— Active Small & Medium Helicopters

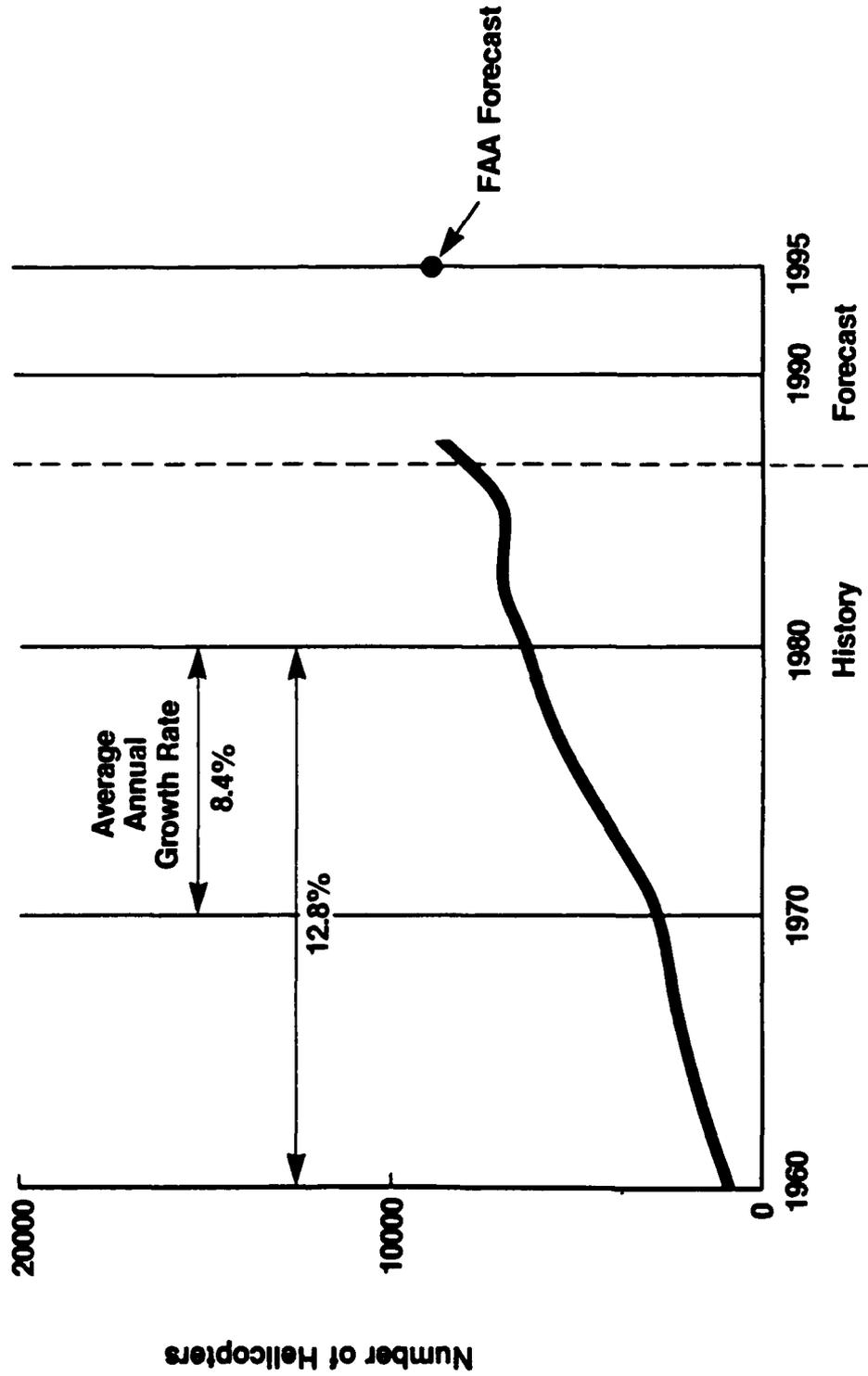


Figure 4

# Fuel Use

## General Aviation Aircraft Fuel Consumption (millions of gallons)

Fiscal Year	Fixed Wing						Rotorcraft		Total
	Piston		Turboprop	Turbojet	Piston	Turbine	Other		
	Single-Engine	Multi-Engine							
<b>Historical*</b>									
1980	287.6	231.1	223.9	474.6	13.3	59.7	0.8	1,291.0	
1981	276.5	206.1	219.6	483.2	13.3	57.8	0.8	1,257.3	
1982	251.2	197.4	230.8	562.1	9.7	62.5	0.5	1,314.2	
1983	235.1	189.3	230.9	396.2	7.8	54.2	0.4	1,113.9	
1984	248.8	196.3	236.4	408.0	8.5	62.9	0.2	1,161.1	
1985	249.4	178.4	210.2	433.2	8.7	58.9	0.1	1,138.9	
1986E	242.9	168.8	200.6	453.5	8.7	61.6	0.1	1,136.2	
<b>Forecast</b>									
1987	239.7	167.9	207.7	480.6	8.7	66.0	0.1	1,170.7	
1988	237.5	167.9	210.1	507.7	8.7	66.9	0.1	1,198.8	
1989	236.2	165.3	217.3	514.4	8.7	69.5	0.1	1,211.5	
1990	235.1	164.4	222.0	514.4	8.7	75.7	0.1	1,220.4	
1991	233.9	164.4	229.2	534.7	8.7	80.1	0.1	1,251.1	
1992	235.4	164.4	243.6	582.1	8.7	86.2	0.1	1,320.5	
1993	236.7	167.0	255.5	615.9	7.7	90.6	0.2	1,373.6	
1994	236.9	167.9	265.1	643.0	7.3	94.2	0.2	1,414.6	
1995	237.7	167.9	267.5	649.8	7.3	97.7	0.2	1,428.1	
1996	238.0	170.5	274.6	670.1	7.3	101.2	0.2	1,461.9	
1997	238.8	171.4	277.0	697.1	7.3	104.7	0.2	1,496.5	
1998	239.1	171.4	284.2	703.9	7.3	108.3	0.3	1,514.5	

\*Source: FAA APO Estimates  
E = Estimate

Figure 5

# Estimated Active General Aviation Aircraft by Type of Aircraft

(in Thousands)

As of January	Fixed Wing						Rotorcraft		Total
	Piston		Turboprop	Turbojet	Turbine	Other	Piston	Turbine	
	Single- Engine	Multi- Engine							
Historical*									
1980	168.4	25.1	3.5	2.7	2.7	4.8	3.1	2.7	210.3
1981	168.4	24.6	4.1	3.0	3.2	4.9	2.8	3.2	211.0
1982	167.9	25.5	4.7	3.2	3.7	5.0	3.3	3.7	213.3
1983	164.2	25.0	5.2	4.0	3.7	5.2	2.4	4.0	209.7
1984	166.4	25.1	5.5	3.9	4.0	5.9	2.5	4.0	213.3
1985	171.9	25.5	5.8	4.3	4.2	6.3	2.9	4.2	220.9
1986	164.4	23.8	5.4	4.4	3.6	6.3	2.9	3.6	210.7
Forecast									
1987	163.7	23.6	5.5	4.6	3.8	6.4	2.8	3.8	210.4
1988	162.3	23.5	5.6	4.8	4.0	6.7	2.7	4.0	209.6
1989	161.0	23.4	5.7	5.0	4.2	7.0	2.6	4.2	208.9
1990	160.0	23.3	5.9	5.2	4.4	7.3	2.6	4.4	208.7
1991	159.4	23.2	6.1	5.4	4.7	7.6	2.5	4.7	208.9
1992	158.8	23.2	6.3	5.6	5.0	7.9	2.5	5.0	209.3
1993	160.0	23.3	6.6	5.9	5.3	8.3	2.5	5.3	211.9
1994	160.5	23.4	6.9	6.2	5.6	8.6	2.4	5.6	213.6
1995	161.0	23.5	7.1	6.4	5.9	8.9	2.4	5.9	215.2
1996	161.5	23.6	7.3	6.6	6.1	9.2	2.3	6.1	216.6
1997	162.0	23.7	7.5	6.8	6.3	9.5	2.2	6.3	218.0
1998	162.5	23.8	7.7	7.0	6.5	9.7	2.1	6.5	219.3

\*Source: FAA Statistical Handbook of Aviation

Notes: Detail may not add to total because of independent rounding.

An active aircraft must have a current registration and it must have been flown at least one hour during the previous calendar year.

Figure 6

# Flight Hours Forecast—

Estimated Hours Flown in General Aviation by Type of Aircraft  
(millions)

Fiscal Year	Fixed Wing						Rotorcraft		Total
	Piston		Turboprop	Turbojet	Piston	Turbine	Other		
	Single-Engine	Multi-Engine							
<b>Historical*</b>									
1980	28.8	6.6	2.1	1.3	0.9	1.8	0.4	41.9	
1981	27.9	6.4	2.2	1.5	0.8	1.8	0.4	41.0	
1982	25.2	6.0	2.1	1.6	0.6	1.8	0.4	37.7	
1983	23.8	5.8	2.2	1.5	0.6	1.7	0.4	36.0	
1984	23.4	5.7	2.4	1.6	0.6	1.9	0.4	36.0	
1985	23.4	5.7	2.6	1.8	0.6	1.7	0.4	36.2	
1986	22.4	4.8	2.1	1.7	0.6	1.8	0.4	33.8	
<b>Forecast</b>									
1987	22.2	4.8	2.2	1.8	0.6	1.9	0.4	33.9	
1988	21.9	4.8	2.2	1.9	0.6	1.9	0.4	33.7	
1989	21.8	4.7	2.3	1.9	0.6	2.0	0.4	33.7	
1990	21.7	4.7	2.4	2.0	0.6	2.2	0.4	34.0	
1991	21.6	4.7	2.4	2.1	0.6	2.3	0.4	34.1	
1992	21.8	4.7	2.6	2.2	0.6	2.5	0.4	34.8	
1993	21.9	4.8	2.7	2.3	0.5	2.6	0.5	35.3	
1994	21.9	4.8	2.8	2.4	0.5	2.7	0.5	35.6	
1995	22.0	4.8	2.8	2.4	0.5	2.8	0.5	35.8	
1996	22.0	4.9	2.9	2.5	0.5	2.9	0.6	36.3	
1997	22.1	4.9	2.9	2.6	0.5	3.0	0.6	36.6	
1998	22.1	4.9	3.0	2.6	0.5	3.1	0.6	36.8	

\* Source: FAA Statistical Handbook of Aviation

E = Estimate

Notes: Detail may not add to total because of independent rounding.

Figure 7

# Instrument Rated Pilots

Estimated Total and Instrument Rated Pilots  
December 31, 1981-85

Calendar Year	Total, Pilots	Instrument Rated Pilots	
		Number	Percent of Total
1985 .....	562,888	258,559	46
1984 .....	572,295	256,584	45
1983 .....	570,807	254,271	45
1982 .....	576,894	255,073	44
1981 .....	584,270	252,535	43

Source: FAA

Estimated: Data is based on a 27-month criteria. Past years are based on a 25-month criteria. Excludes student pilots.

Estimated Instrument Ratings Held by Class of Certificates:  
December 31, 1985 and 1984

Class of Certificates	1985	1984	Percent Change 1985-1984
Total—all groups .....	258,559	256,584	+1
Private pilots—total .....	43,902	43,312	+1
Commercial pilots—total .....	126,352	128,978	-2
Airline transport pilots—total .....	82,740	79,192	+4
Rotorcraft pilots—total .....	5,565	5,102	+9

FAA statistical handbook of aviation calendar year 1985.

Figure 8

# Master Plan Functions

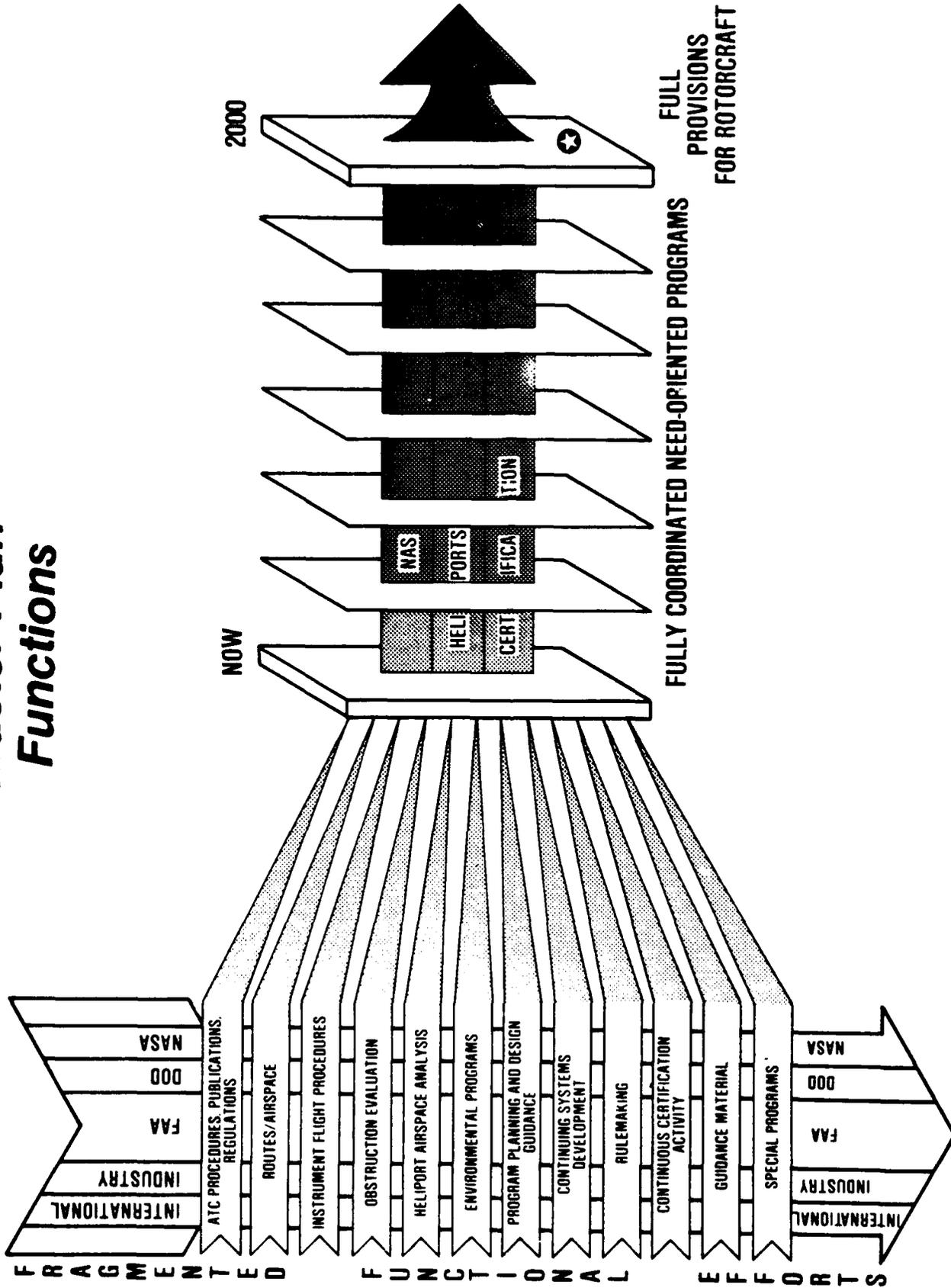
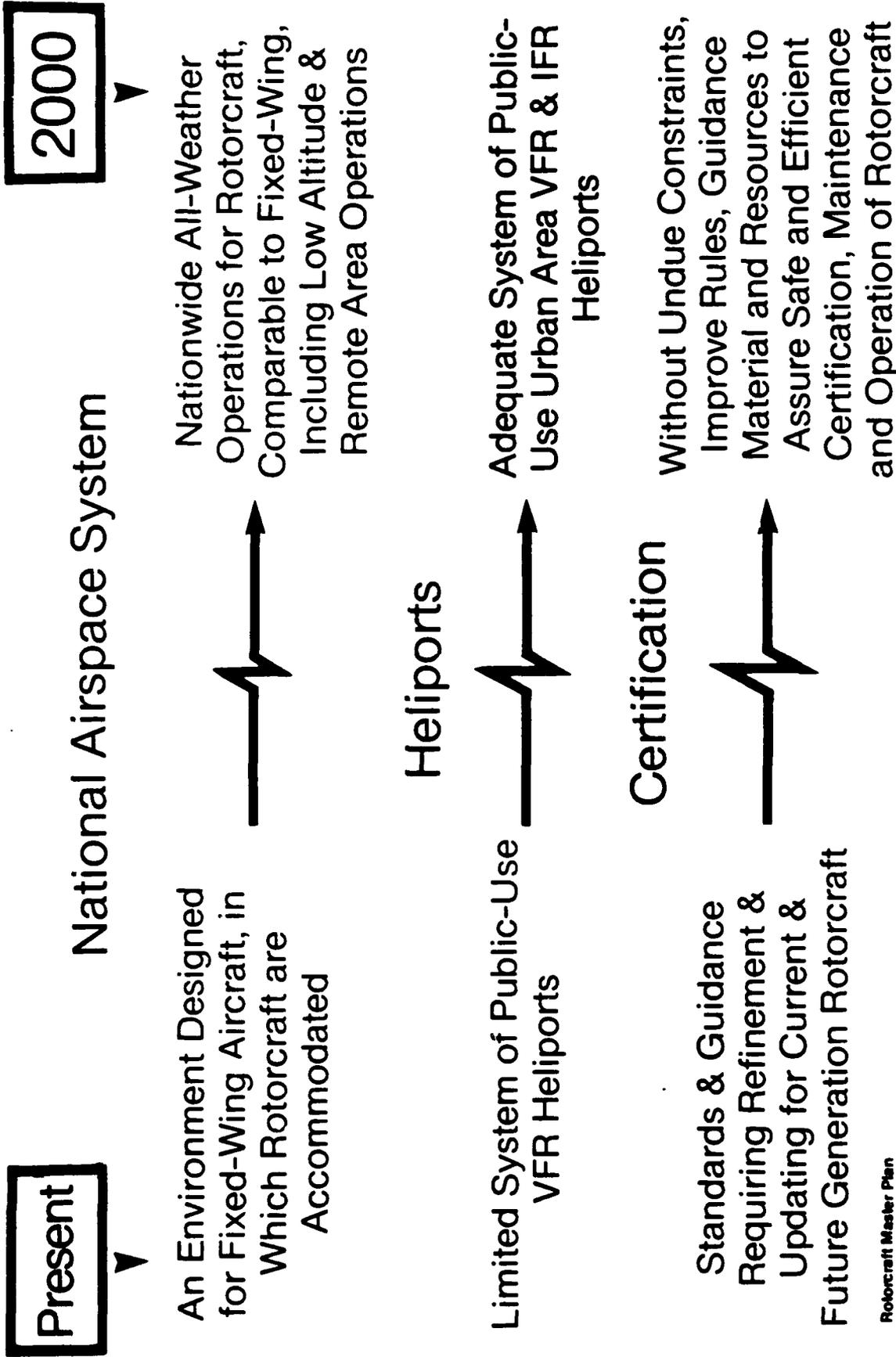


Figure 9

# Where We Are-Where We're Going



# Evolution Targets

<p><b>ROTORCRAFT</b></p>	<p>★ CURRENT MIX OF HELOS --SMALLER W/F R&lt;1000 LBS --50% W/F R DELIV</p>	<p>★ INCREASING DELIV OF 10,000 LB 140 KT W/F R MACHINES</p>	<p>★ LARGER LONGER RANGE FASTER MACHINES 20,000-30,000 LB 180 KT</p>	<p>★ NEW ROTORCRAFT CONCEPTS IN USE (17R THORON etc.) 50,000 LB 300 KT HIGH ALTITUDE CRUISE</p>	<p>★ 2000 W/F R 30 TON PAYLOAD X WING MARCH 9</p>
<p><b>A/C SYSTEMS</b></p>	<p>★ ADVANCED CHECKPOINT SYSTEMS PROVIDED BY INDUSTRY</p>	<p>★ INDUSTRY PROVIDES IMPROVED VISUAL CUES</p>	<p>★ TYP MIN W/F R SPEED 40 KTS</p>	<p>★ TYP MIN W/F R SPEED 0 KTS CAT IN C/W/INLS</p>	<p>★ APPROXIMATE IMAGING SYSTEMS BECOME COST EFFECTIVE RE-EMERGE/RE-APPEARANCE PRECISION APPROACH/DEPARTURES W/O INLS</p>
<p><b>AIRSPACE/ NAS EQUIP</b></p>	<p>★ IMPROVED ROUTE STRUCTURES IN CONCENTRATION AREAS</p>	<p>★ FAA PROVIDES W/F R SYSTEMS DESIGN &amp; SERVICES FOR INDUSTRY</p>	<p>★ DISCRETE HELICOPTER APPROACH DEPARTURE AREAS (PUBLIC) RANDOM ROUTING INDUSTRY</p>	<p>★ HIGH/LOW ALTITUDE A/C PROCEDURES FOR NEW GEN ROTORCRAFT</p>	<p>★ REMOTE/LOW ALT NAV/COMM SUPPORT A/C SYSTEM</p>
<p><b>HELIPORTS</b></p>	<p>★ FAA/INDUSTRY INITIATIONAL PROTOTYPE DEMONSTRATION HELIPORT &amp; DEV PROGRAM</p>	<p>★ PUBLISHED ALL W/F R HELIPORT DESIGN CRITERIA</p>	<p>★ LARGER HELIPORTS FOR HELICOPTERS 1st PUBLIC USE HELIPORT BUILT UNDER PUBLISHED NONPRECISION LANDING ALL W/F R CRITERIA</p>	<p>★ ALL W/F R HELIPORTS W/SUPPORTING TERMINAL AREA ROUTE STRUCTURE IN 15 MAJOR CITIES</p>	<p>★ ALL W/F R HELIPORTS W/SUPPORTING TERMINAL AREA ROUTE STRUCTURE IN 25 MAJOR CITIES</p>
<p><b>CERTIFICATION</b></p>	<p>★ 1st U.S. WING CERT CURRENT GENERATION ROTORCRAFT REGULATORY REVIEWS COMPLETED</p>	<p>★ ALL W/F R HELICOPTER CRITERIA LOW SPEED W/F R CERT</p>	<p>★ NEW ROTORCRAFT CONCEPTS CERTIFIED W/F R WING CERT</p>	<p>★ NEW ROTORCRAFT CONCEPTS CERTIFIED W/F R WING CERT</p>	<p>★ NEW ROTORCRAFT CONCEPTS CERTIFIED W/F R WING CERT</p>
<p><b>POLICY</b></p>	<p>★ FAA FORECASTING COST BENEFIT TOOLS CONTRIBUTING PUBLIC AWARENESS PROGRAMS</p>	<p>★</p>	<p>★</p>	<p>★</p>	<p>★</p>

NOW 1985 1990 1995 2000

Figure 11

# Plan Symbolology

- Projects in Being; Near Term Plans
  - △ = Start
  - ▽ = End
  - = Event
- Estimates; Long Term Plans
  - ◊ = Start
  - ◃ = End
  - = Event
- Program Office Plan Approval; Funding of Required Efforts
  - ▬ = Approved, Fully Funded
  - ▨ = Partially Approved, Partly Funded
  - = Not Approved, No Funding

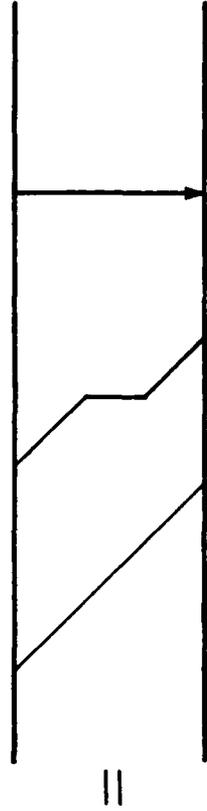
# Plan Symbology

(Continued)

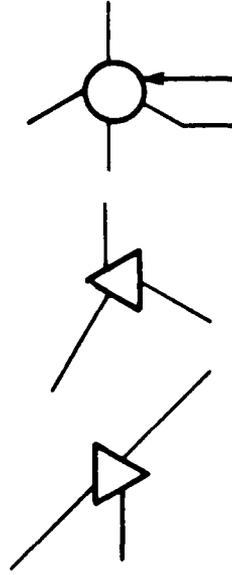
- Primary Goal = ☆

- Secondary Goal = ☆

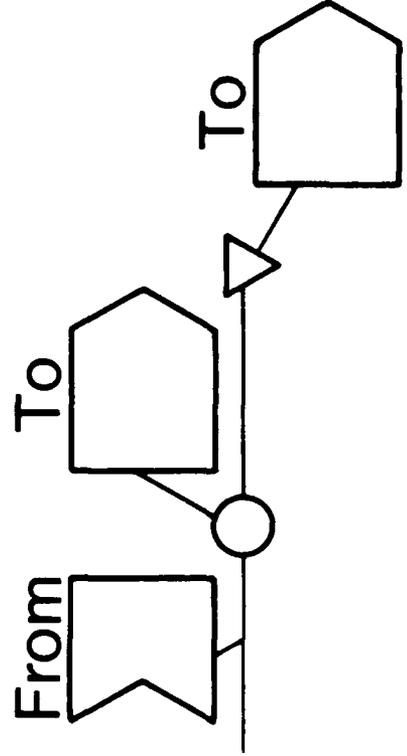
- Feeding of Results into On-Going Task/Project/Program

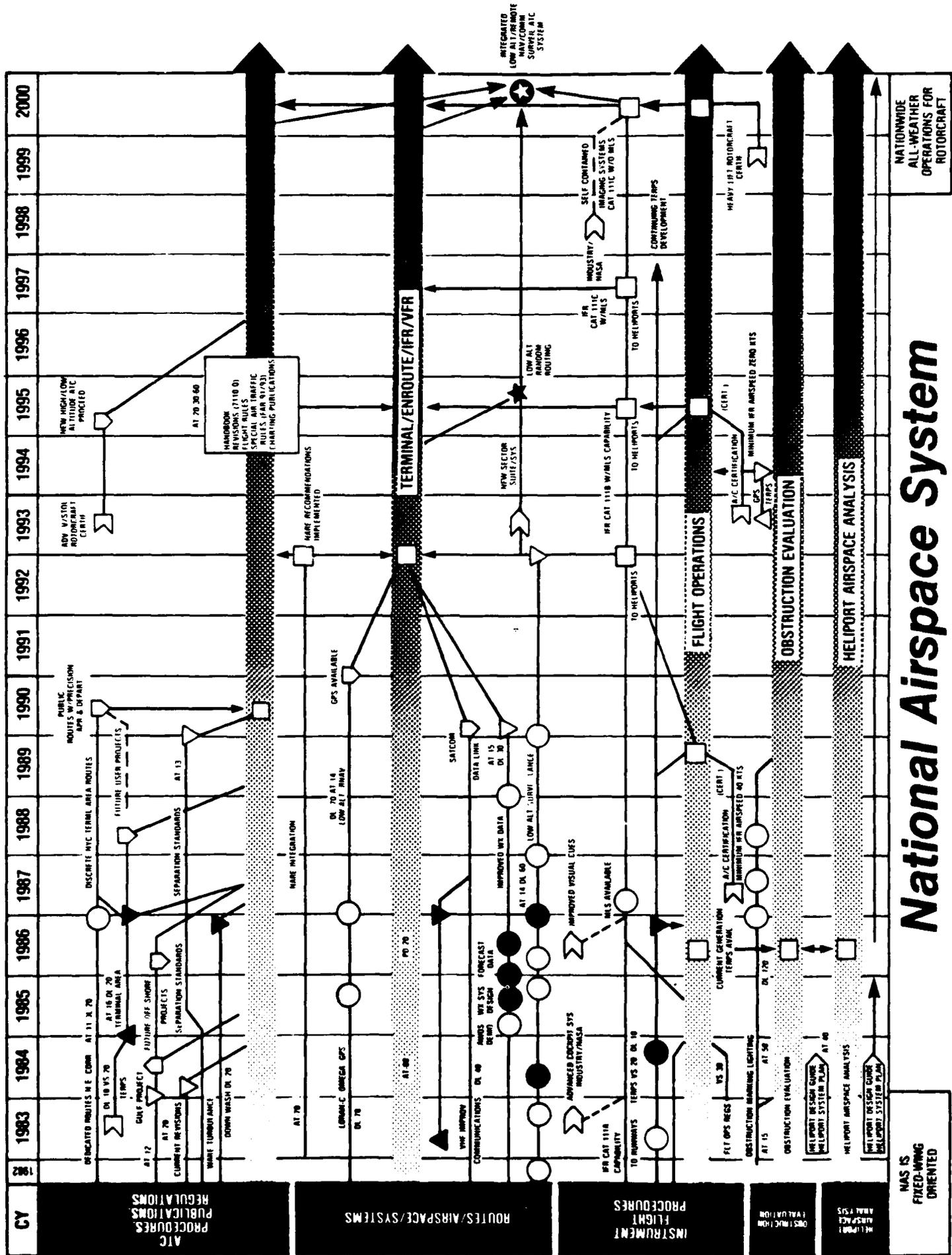


- Feeding of Results From or Into a Specific Event



- Handoff of Product From One Category to Another

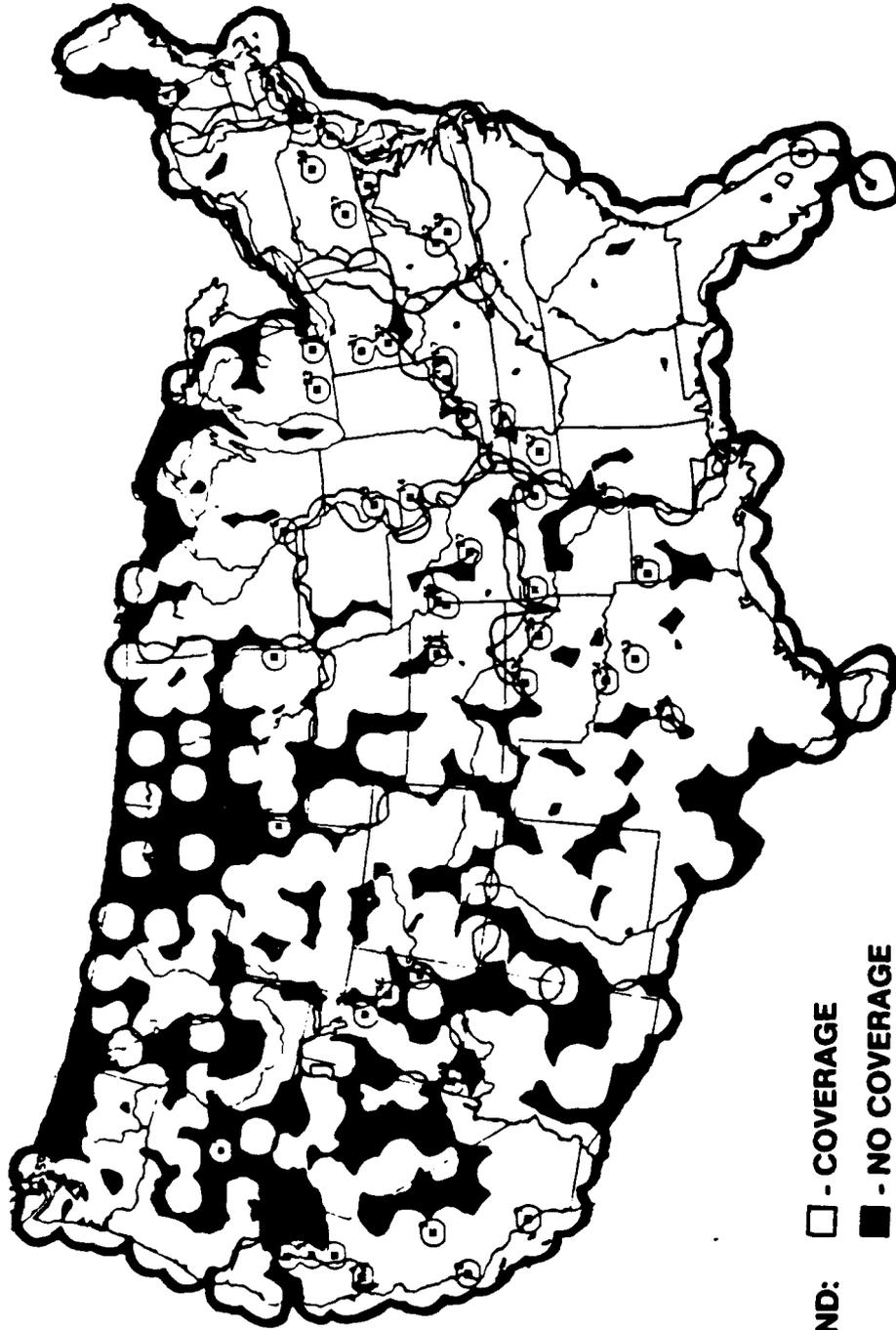




# National Airspace System

Figure 13

# Composite Coverage VOR Coverage at 8,000 Feet AGL

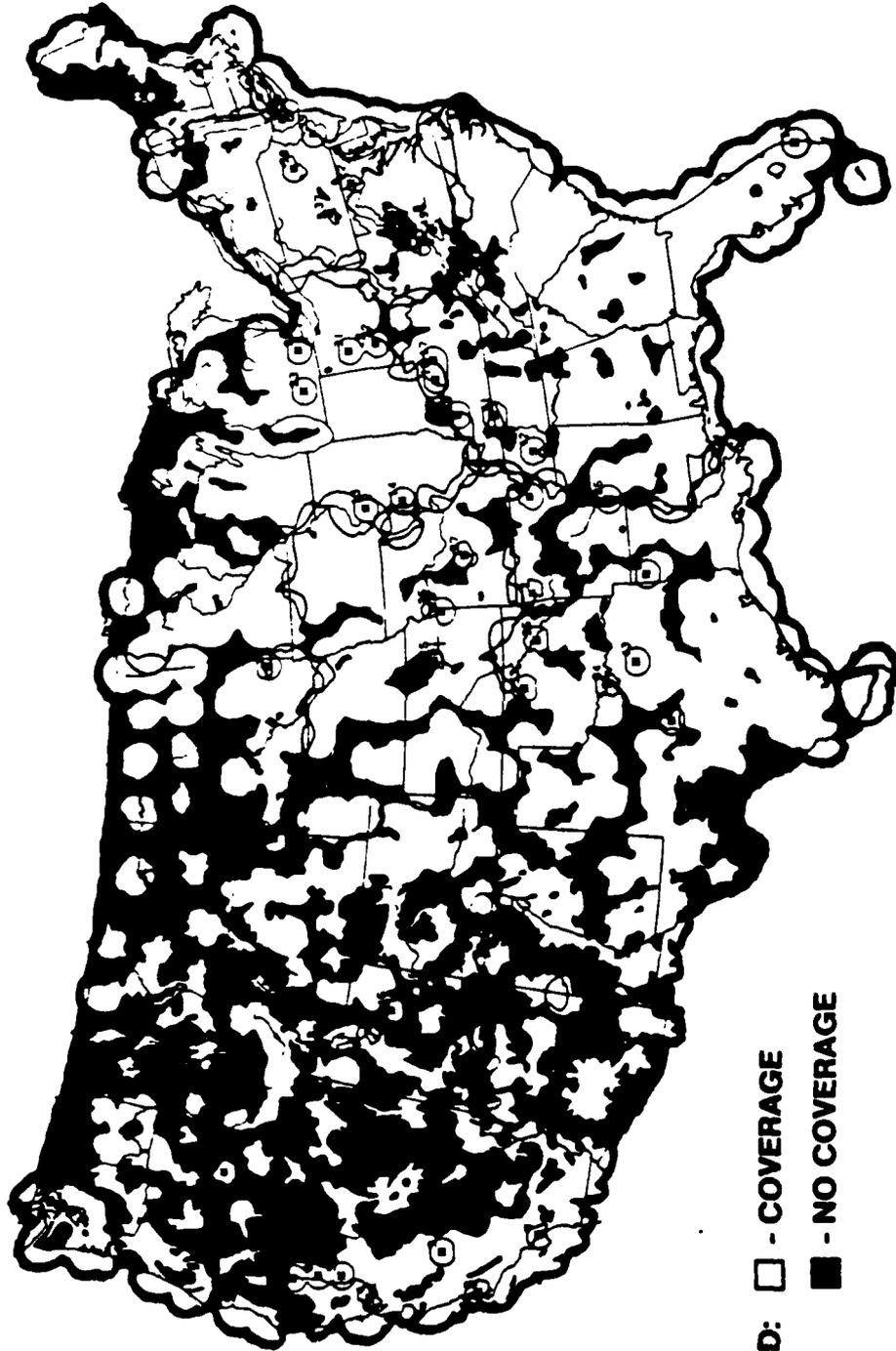


LEGEND: □ - COVERAGE  
■ - NO COVERAGE

VOR COVERAGE AT 8000 FEET ABOVE GROUND LEVEL (AGL)

Figure 14

# Composite Coverage VOR at 1000' AGL



LEGEND: □ - COVERAGE  
■ - NO COVERAGE

VOR COVERAGE AT 1000 FEET ABOVE GROUND LEVEL (AGL)



# FAA/Industry National Prototype Heliport Demonstration & Development Program

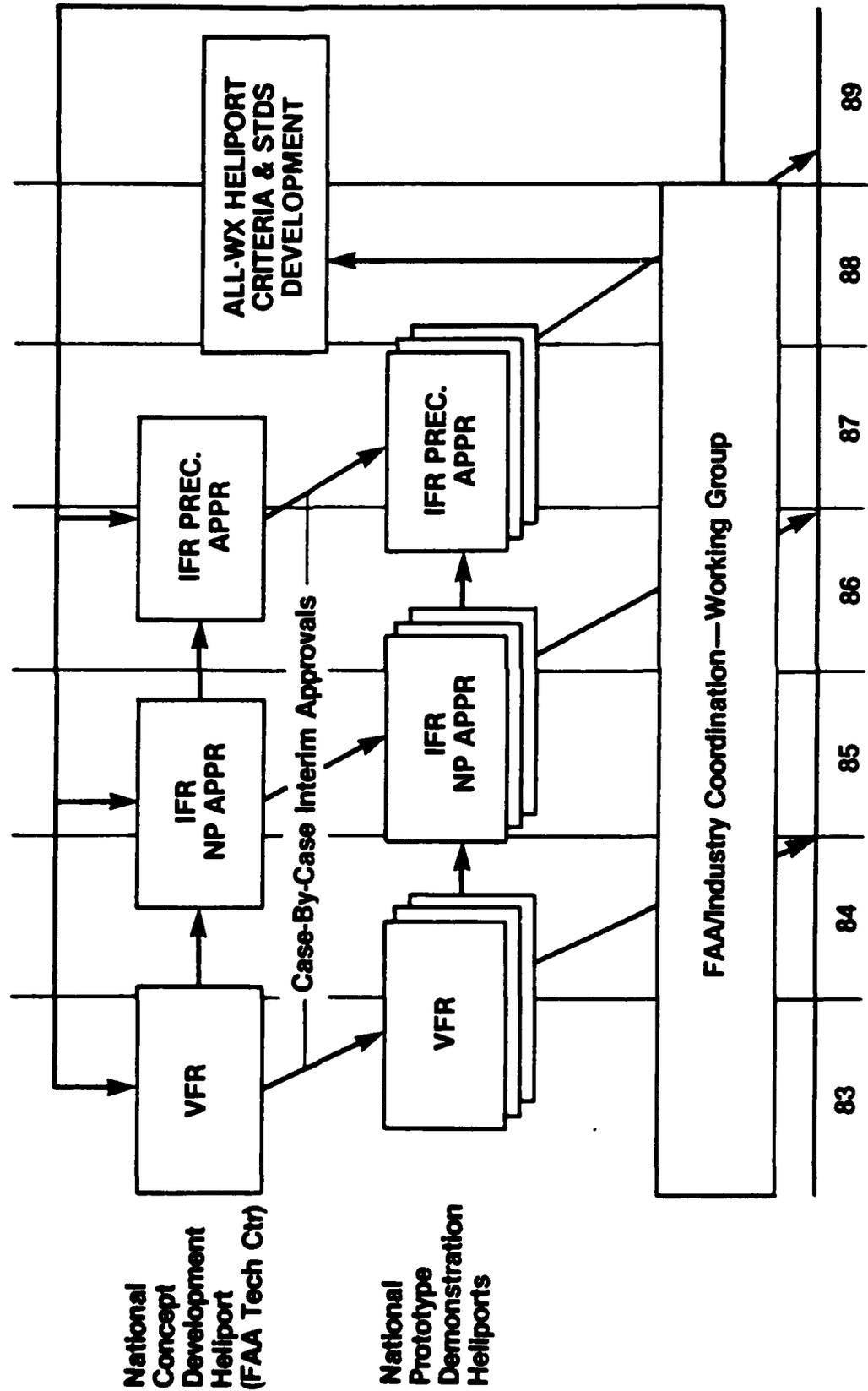
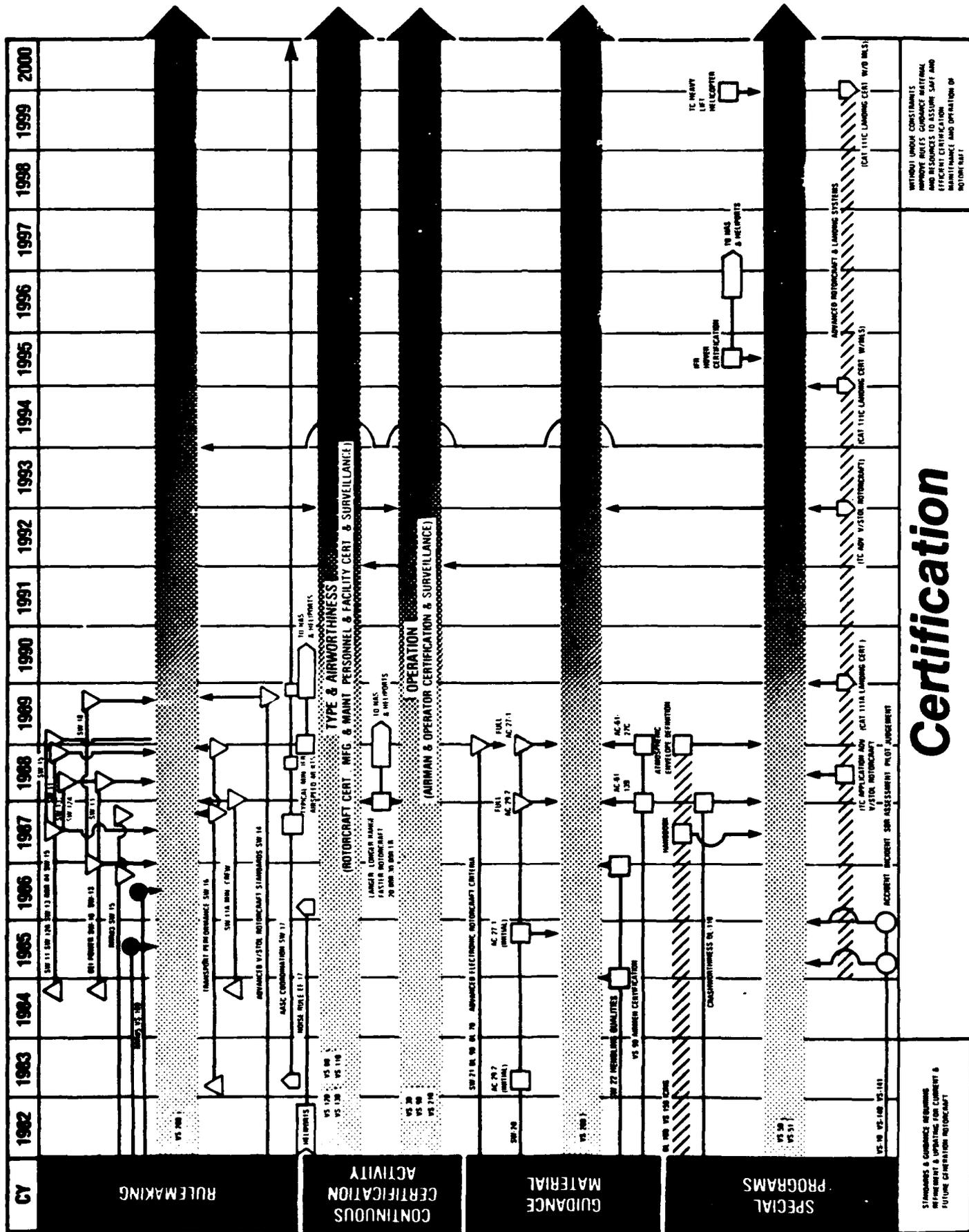


Figure 17



**AIR TRAFFIC PROGRAMS**

## AIR TRAFFIC SUMMARY

### 1. Major Accomplishments Include:

- (1) Recent changes to the Air Traffic Controller's Handbook (7110.65) which are specifically targeted at facilitating the movement and handling of rotary wing aircraft include the following.
  - a. Runway Definition—The term runway has been redefined to mean the runway used by aircraft, and in discussions of separation standards, the term runway is applicable to helipads and accompanying takeoff/landing courses.
  - b. Radar Departures—Helicopters have been specifically included in radar departures by incorporating the use of takeoff pads and their accompanying departure courses to establish departure separation.
- (2) Publication of a prototype helicopter chart for the New York terminal area.
- (3) Washington, DC Helicopter Route Chart was published in February 1986.
- (4) Preliminary work on a helicopter route chart for the greater Chicago metropolitan area was completed in April 1987.

### 2. Current Projects Include:

- (1) Development has begun on a "guide" for use by air traffic management and local authorities in conjunction with user groups to use in the development, production, and distribution of site specific helicopter route charts.
- (2) Program evaluating obstructions within helicopter landing areas and en route airspace (see Resume ATO-82-051-M).
- (3) Development of a system to allow for a more expeditious movement of helicopters into, through, within, and between major metropolitan areas in all weather conditions.
- (4) Terminal helicopter instrument procedures (see Resume ATO-82-016-M).
- (5) Interfacing RNAV and other instrument flight rules (IFR) separation criteria to support IFR Loran C operations in the offshore IFR system developed by Houston Air Route Traffic Control Center (see Resume ATO-82-012-M).

3. Future Plans Include:

- (1) Development, where feasible of reduced separation standards resulting from the ongoing wake vortex studies.
- (2) Development of a system to:
  - a. Bring helicopters from the en route IFR environment down to visual condition to allow ingress into the major metropolitan areas on a noninterfering basis.
  - b. Allow helicopters to egress major metropolitan areas in visual conditions and proceed to a point in space where they can enter the en route IFR environment.
  - c. Facilitate the intra and inter city movement of helicopters in visual conditions.

4. Problem/Needs and Actions Being Taken:

There is a need for continued wake turbulence studies to determine the limits of separation of rotorcraft from each other and from fixed-wing aircraft.

5. Agency Obligations/Responsibilities to Provide for Rotorcraft--What and How to Improve Support:

- (1) Rotorcraft capabilities have been addressed with regard to operating rules and air traffic control procedures. Nonetheless, requests or plans for routes, airspace, etc., designed specifically for rotorcraft operations should be thoroughly examined. It would be costly and counterproductive to design a separate or unique system for rotorcraft without first determining that a common national air space cannot accommodate rotorcraft activities.
- (2) The results of the wake turbulence studies will also have an impact on rotorcraft operations, both in the en route and terminal phases of operations.

N	H	C	<u>Air Traffic (ATO)</u>
x			* ATO-82-010-M ATS Implementation/Refinement of NAS Plan Tasks
x			ATO-82-011-M Discrete Helicopter Routes
x			ATO-82-012-M Overwater Route Width Reduction and ATC Separation
x	x		ATO-82-013-M Helicopter Separation Standards
x			* ATO-82-014-M Low Altitude Random Routing
x	x		ATO-82-015-M Improved Weather Reporting and Gathering
x			ATO-82-016-M Terminal Area Studies
x	x		* ATO-82-020-M Air Traffic Operations Service (Control Handbook Changes)
x			* ATO-82-030-M Air Traffic Rules
x			* ATO-82-031-M Flight Rules; FAR Part 91, Subpart B
x	x		* ATO-82-032-M Special Air Traffic Rules and Airport Traffic Patterns; FAR Part 93
x	x		* ATO-82-040-M Airport/Heliport Airspace Analysis
x	x		* ATO-82-050-M Obstruction Evaluation
x	x		ATO-82-051-M Obstruction Marking, Lighting, and Detection
x			* ATO-82-060-M Publications
x	x		* ATO-82-061-M Airport/Facility Directory
x			ATO-82-070-M National Airspace Review Enhancement (NARE)
x			* ATO-82-080-M Air Traffic Control









PROJECT TITLE: LOW ALTITUDE RANDOM ROUTING  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AIR TRAFFIC PROGRAM

RESUME DATE: 01/08/87 LAST REVISION: 06/23/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: VANDEL, BOB, ATO-329 (202) 267-9340 \*  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: TO ALLOW HELICOPTERS TO OPERATE IN INSTRUMENT METEOROLOGICAL CONDITIONS (IMC) WITH COMPARABLE PERFORMANCE AS UNDER VISUAL METEOROLOGICAL CONDITIONS (VMC). TO PROVIDE ADEQUATE SURVEILLANCE OF LOW ALTITUDES, BEYOND RADAR COVERAGE, FOR HELICOPTER OPERATIONS THROUGHOUT THE U.S.

REQUIREMENT: TO PROVIDE ATC TECHNIQUES AND PROCEDURES THAT WILL ALLOW HELICOPTERS TO OPERATE BELOW OR BEYOND RADAR COVERAGE AT LOW ALTITUDES. THIS NECESSITATES THE ABILITY TO PROVIDE FOR LOW ALTITUDE TRACKING AND RECEIPT OF THE HELICOPTER'S POSITION VIA DATA LINK AND ULTIMATE PROCESSING OF DATA FOR FULL ATC RANGE OF SERVICES (DIRECT, RANDOM ROUTING AT LOW ALTITUDES) UNDER THE ADVANCED AUTOMATION.

MILESTONE SCHEDULE	COMPLETION DATES:	SCHED.	REVISED	ACTUAL
DEFINE ATC CONCEPTS-3D/4D GUID. TECHNIQUES		12/31/89		
EVALUATE ATC SYSTEM VIA SIMULATION		12/31/90		
LOW ALT. COM/NAV/SURV IMPROVEMENTS DEFINED		12/31/85	08/31/89	*
COMPLETE REQUIRED SYSTEMS DEVELOPMENT		12/31/92		
COMPLETE IMPLEMENTATION		12/31/95		

STATUS: THERE ARE CURRENTLY PROCEDURES IN EFFECT FOR USE BY \*  
 CONTROLLERS TO HANDLE LOW-ALTITUDE RANDOM ROUTING. THIS RESUME IS BEING \*  
 RETAINED IN THIS EDITION FOR ACCOUNTABILITY. IT WILL BE DELETED IN THE \*  
 NEXT EDITION. \*

REMARKS/NOTES: R&D FUNDS HAVE BEEN IDENTIFIED IN RESUMES ADL-82-020-M, \*  
 ADL-82-040-M, ADL-82-060-M, AND ADL-82-070-M. DEVELOPMENT IS DEPENDENT \*  
 UPON COOPERATIVE INDUSTRY AND FAA COMMITMENT. ADL IS INVESTIGATING THE \*  
 USE OF LOW COST MODE S-BASED INTERROGRATORS TO AUGMENT THE SECONDARY \*  
 SURVEILLANCE NETWORK. THIS RESUME REPLACES RESUME AT-16, LOW ALTITUDE \*  
 RANDOM ROUTING FROM THE 1984 ROTORCRAFT MASTER PLAN. \*

AVS RESUME

ATO-82-015-M

PROJECT TITLE: IMPROVED WEATHER REPORTING AND GATHERING  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AIR TRAFFIC PROGRAM

RESUME DATE: 01/08/87 LAST REVISION: 06/23/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: ADAMS, HARRY, ATO-360 (202) 267-9344 \*  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: TO PROVIDE REAL-TIME WEATHER DIRECTLY TO THE HELICOPTER PILOT BY UTILIZING IMPROVED AUTOMATED WEATHER AND SHORT-TERM FORECAST PROCEDURES.

REQUIREMENT: DEVELOP THE TECHNIQUES FOR AUTOMATICALLY GATHERING AND DISSEMINATING LOCAL AND ENROUTE WEATHER VIA DATA LINK DIRECTLY TO THE COCKPIT. DEVELOP SMALL, LOW-COST WEATHER OBSERVATION SYSTEM FOR HELIPORTS.

MILESTONE SCHEDULE	COMPLETION DATES:	SCHED.	REVISED	ACTUAL
IMPROVED WEATHER DISSEMINATION		12/31/88		

STATUS: PROJECT WAS COMMENCED IN 1984. AWOS DEMONSTRATION UNITS WERE INSTALLED AT THE FAA TECHNICAL CENTER AND THE INDIANAPOLIS HELIPORT IN 1985.

REMARKS/NOTES: NATIONAL PROTOTYPE DEMONSTRATION HELIPORTS WILL RECEIVE AUTOMATIC WEATHER OBSERVATION SYSTEMS (AWOS). NEW ORLEANS HELIPORT IS PROGRAMMED TO RECEIVE AWOS IN THE NEAR FUTURE. THIS RESUME REPLACES RESUME AT-17, IMPROVED WEATHER REPORTING AND GATHERING FROM THE 1984 ROTORCRAFT MASTER PLAN.



AVS RESUME

ATO-82-020-M

-----  
PROJECT TITLE: AIR TRAFFIC OPERATIONS SERVICE  
PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AIR TRAFFIC PROGRAM  
-----

RESUME DATE: 01/08/87 LAST REVISION: 06/23/87 REACTIVATED:

-----  
STAFF: PRINCIPAL SPECIALIST: VANDEL, BOB, ATO-329 (202) 267-9340 \*  
TEAM LEADER :  
WRITER/EDITOR :

-----  
OBJECTIVE: TO IMPROVE THE EFFICIENCY OF THE NAS BY PUBLISHING CHANGES  
TO THE AIR TRAFFIC CONTROL HANDBOOK, 7110.65. DEVELOP, COORDINATE, REVIEW, \*  
AND CIRCULATE INFORMATION FOR USE BY AIR TRAFFIC CONTROL PERSONNEL AND  
PRIVATE INDUSTRY WITH RESPECT TO ROTORCRAFT IN THE NAS.  
-----

REQUIREMENT: THE COMPLEXITY OF OPERATIONS AND THE AIRCRAFT PILOT  
REQUIREMENTS DEMAND THAT PILOTS AND CONTROLLERS BE AWARE OF THE OPERATIONAL  
REQUIREMENTS OF THE NAS REGARDING ROTORCRAFT.  
-----

STATUS: THIS A CONTINUING EFFORT.  
-----

REMARKS/NOTES: KEY FACTORS ARE FUNDING AND THE NECESSARY R&D TO DEVELOP  
ADEQUATE CRITERIA.  
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AVS RESUME

ATO-82-051-M

PROJECT TITLE: OBSTRUCTION MARKING, LIGHTING, AND DETECTION  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AIR TRAFFIC PROGRAM

RESUME DATE: 01/12/87      LAST REVISION: 07/10/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: VANDEL, BOB, ATO-329 (202) 267-9340  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: TO PROVIDE THE MOST EFFECTIVE MEANS OF INDICATING THE PRESENCE OF OBSTRUCTIONS TO PILOTS BY DEVELOPING MINIMUM STANDARDS FOR MARKING AND LIGHTING TO ENSURE AN ADEQUATE LEVEL OF CONSPICUITY.

REQUIREMENT: OBSTRUCTIONS ARE OFTEN DIFFICULT TO SEE DURING DAYLIGHT, E.G., BROADCAST ANTENNAS, TRANSMISSION LINES, ETC., ESPECIALLY IN LOW VISIBILITY CONDITIONS AND IMPOSSIBLE TO SEE AT AT NIGHT UNLESS MADE CONSPICUOUS. MARKING AND LIGHTING STANDARDS HAVE BEEN DEVELOPED; HOWEVER, IMPROVEMENT IN ENHANCING THE CONSPICUITY OF OVERHEAD WIRES IS DESIRABLE. \*

MILESTONE SCHEDULE	COMPLETION DATES:	SCHED.	REVISED	ACTUAL
DEVELOP A PROJECT PROGRAM		06/30/90		
EVALUATION AND ANALYSIS		03/31/91		

STATUS: OFFICE OF PROGRAM AND ENGINEERING MAINTENANCE SERVICE IS DEVELOPING THE PROJECT PROGRAM FOR OBSTRUCTION AVOIDANCE.

REMARKS/NOTES: RESUME ATO-82-051-M IS DEPENDENT ON COMPLETION OF WORK IN RESUME ADL-83-120-M. DUE TO LIMITED RESOURCES IN ADL, THE SCOPE OF ADL'S PROJECT IS BEING REEVALUATED. (SEE RESUME ADL-83-120-M.)





AVS RESUME

ATO-82-070-M

PROJECT TITLE: NATIONAL AIRSPACE REVIEW ENHANCEMENT (NARE)  
 PROJECT CATEGORY: ROTOCRAFT MASTER PLAN AIR TRAFFIC PROGRAM

RESUME DATE: 01/13/87      LAST REVISION: 08/18/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: VANDEL, BOB, ATO-329 (202) 267-9340  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: IDENTIFY AND IMPLEMENT CHANGES TO PROMOTE GREATER EFFICIENCY FOR AIRSPACE USERS, SIMPLIFY THE ATC SYSTEM, AND MATCH AIRSPACE AND AIR TRAFFIC CONTROL TO TECHNOLOGICAL IMPROVEMENTS.

REQUIREMENT: IDENTIFY AND IMPLEMENT RECOMMENDATIONS RELATED TO THE UNIQUE CAPABILITIES AND REQUIREMENTS OF ROTOCRAFT.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.	REVISED	ACTUAL
NAR RECOMMENDATIONS	12/31/88		
INITIATION OF NAR ENHANCEMENT PROGRAM	04/30/88		
NAR AND NARE INTEGRATION	12/31/90		

STATUS: THIS IS A CONTINUING EFFORT.

REMARKS/NOTES: INDUSTRY PARTICIPATES IN NARE TASK GROUPS. COST/BENEFIT UTILITY OF RECOMMENDATIONS IS REVIEWED BY THE FAA PRIOR TO IMPLEMENTATION. REGULATORY PROCESS COULD POSE A DELAY IN IMPLEMENTATION IN NAR AND NARE RECOMMENDATIONS. \*

AVS RESUME

ATO-82-080-M

-----  
PROJECT TITLE: AIR TRAFFIC CONTROL  
PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AIR TRAFFIC PROGRAM  
-----

RESUME DATE: 01/13/87 LAST REVISION: 06/25/87 REACTIVATED:

-----  
STAFF: PRINCIPAL SPECIALIST: VANDEL, BOB, ATO-329 (202) 267-9340 \*  
TEAM LEADER :  
WRITER/EDITOR :  
-----

OBJECTIVE: TO PROVIDE FOR SAFE AND EFFICIENT MANAGEMENT OF CIVIL AND  
MILITARY AIR TRAFFIC IN THE NAVIGABLE AIRSPACE.  
-----

REQUIREMENT: TO APPLY POLICIES, PROGRAMS, REGULATIONS, STANDARDS, AND  
PROCEDURES FOR SEPARATION AND CONTROL OF, AND FLIGHT ASSISTANCE TO, AIR  
TRAFFIC.  
-----

STATUS: THIS IS A CONTINUING EFFORT.  
-----  
-----

**AVIATION STANDARDS PROGRAMS**

## AVIATION STANDARDS SUMMARY

### 1. Major Accomplishments Include:

- (1) Formal dedication ceremonies for the Indianapolis Downtown Heliport were held on May 9, 1985. Indianapolis is the first of the Nation's downtown public-use heliports under the FAA/Industry National Prototype Heliport Demonstration and Development Program.
- (2) Formal dedication ceremonies for the second downtown public-use heliport, New Orleans Downtown Heliport, under the FAA/Industry National Prototype Heliport Demonstration and Development Program were held on January 21, 1986.
- (3) Amended SFAR 38 and Part 121 to require commercial rotorcraft certification and operations to be in accordance with FAR Part 135.
- (4) Granted exemptions to certain operators relieving requirement for 10 hours continuous rest (now 8 hours).
- (5) Developed and implemented lower takeoff minimums for helicopters operating under FAR Part 135.
- (6) Issued national guidance for credit to be granted for required checks and training that has been given in training devices.
- (7) Approved BH-222 and S-76 training devices as acceptable for certain phases of FAR Part 135 Air Taxi training.
- (8) Amended FAR Part 135 so that helicopter certificate holders who use only one pilot are not required to have specific management personnel, training programs, or an operation manual.
- (9) Developed criteria for test program allowing checking credit under FAR Part 135 in helicopter simulators.
- (10) Initiated effort to assess the impact of pilot judgment on rotorcraft accidents (see Resume AVS-83-141-M). Contractor report on helicopter pilot judgment training manual issued in February 1987.
- (11) A Technical Standard Order (TSO-C102) for airborne radar approach systems for helicopters has been developed.
- (12) Developed and implemented airmen written tests to conform with FAR Part 61 (change effective January 6, 1987), SFAR 38.3 for Helicopter ATP, and commercial pilot certificates.

- (13) Developed airmen written test and practical test standards for the recreation pilot helicopter certificate.
- (14) Rotorcraft Regulatory Review No. 5 (Operations and Maintenance) final rule was published in the Federal Register on November 7, 1986, with an effective date of January 6, 1987.

2. Current Projects Include:

- (1) Developing helicopter straight-in, steep angle MLS approach criteria for conventional airport sites. Draft criteria have been developed (see Resume AVS-82-020-M).
- (2) A helicopter safety film is in preparation (see Resume AVS-82-040-M).
- (3) Developing the criteria to permit rotorcraft to operate to reduced IFR approach minimums in an airport runway environment (see Resume AVS-84-230-M).
- (4) Developing the criteria to permit rotorcraft to operate to IFR approach to hover and takeoff in a heliport environment (see Resume AVS-84-230-M).
- (5) Developing a pilot judgment training program for helicopter pilots (see Resume AVS-83-141-M).

NOTE: The FAA/Industry National Prototype Heliport has been transferred to the Associate Administrator for Airports. Project resumes are in Chapter 5.

3. Future Plans Include:

- (1) To develop/publish MLS curved path approach criteria (see Resume AVS-82-023-M).
- (2) To revise/rewrite Chapter 11 of TERPS (Helicopter Instrument Procedures) for conventional NAVAIDS. Draft copy completed (see Resumes AVS-82-021-M and AVS-82-022-M).
- (3) To consider use of rotorcraft simulators for airman certification (see Resume AVS-83-051-M).

4. Agency Obligations/Responsibilities to Provide For Rotorcraft—What and How to Improve Support:

The FAA plans for rotorcraft are: (1) to provide a system that brings helicopters to the level of safety comparable to fixed-wing aircraft; and (2) to provide a system that provides for increased use of the helicopter, especially in all-weather operations.

N	H	C	<u>Aviation Standards (AVS)</u>
		x	* AVS-82-010-M Safety Data Analysis
x	x		AVS-82-020-M Instrument En Route and Terminal Procedures (TERPS)
x	x		AVS-82-021-M TERPS Chapter 11 Lafayette Conventional NAVAIDS
x	x		AVS-82-022-M TERPS Chapter 11 FAA TC Conventional NAVAIDS
x	x		AVS-82-023-M TERPS Chapter 11 Split Site/Collocated MLS
x	x		AVS-82-024-M TERPS Chapter 11 MLS Collocated Site
x	x		AVS-82-025-M TERPS Chapter 11 ARA and HEDA
x	x		AVS-82-026-M TERPS Chapter 11 RNAV
x	x		AVS-82-027-M TERPS Chapter 11 Departure Criteria
x	x		AVS-82-028-M TERPS Chapter 17 En Route RNAV
			AVS-87-029-M Rotorcraft Performance in the Visual Segment
x	x	x	AVS-82-030-M Regulatory Activities—Operations
x			AVS-82-040-M Helicopter Safety Program
x		x	AVS-83-050-M Helicopter Training Device/Simulator Checking Credit to Part 135 Operators
x		x	AVS-83-051-M Rotorcraft Simulator Use in Airman Certification
		x	* AVS-82-090-M Rotorcraft Airmen Certification
x		x	AVS-80-100-M Rotorcraft Regulatory Review Program Notice No. 5 (Operations and Maintenance)
		x	* AVS-82-110-M Engineering Assistance to the Rotorcraft Certification Directorate
		x	* AVS-82-120-M Rotorcraft Manufacturing

\* = Long-term, Continuing Program/Project  
N = National Airspace System  
H = Heliports  
C = Certification

Aviation Standards (AVS)

N	H	C	
		x	* AVS-82-130-M Rotorcraft Maintenance
		x	AVS-82-140-M Rotorcraft Accident Assessment
		x	AVS-83-141-M Rotorcraft Pilot Judgment
		x	AVS-81-150-M Rotorcraft Icing Research
		x	* AVS-84-200-M Rotorcraft Engineering
		x	AVS-85-202-M Rotorcraft Advanced Flight Controls/Display Systems Criteria
		x	AVS-85-203-M Rotorcraft IMC Fully-Coupled Approach/Minimum Equipment Criteria
		x	* AVS-82-210-M Certification and Surveillance of Rotorcraft Operations
x		x	AVS-84-230-M Rotorcraft IFR Approach Minimums
		x	AVS-84-240-M Update of FAA Sikorsky S-76 Helicopter
x		x	AVS-86-250-M Tilt Rotor Aircraft Assessment

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PROJECT TITLE: SAFETY DATA ANALYSIS  
PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS  
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RESUME DATE: 02/09/87      LAST REVISION: 08/18/87      REACTIVATED:

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STAFF: PRINCIPAL SPECIALIST: ELDON JOHNSON  
      TEAM LEADER           : MCLEAN , J                   AVN-123   (405)686-4171  
      WRITER/EDITOR        :  
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OBJECTIVE:            TO MAINTAIN A COMPLETE DATA BANK AND IMPROVE SAFETY BY  
DETERMINING TRENDS BEFORE FURTHER ACCIDENTS, INCIDENTS, OR MECHANICAL  
DISCREPANCIES OCCUR.

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REQUIREMENT:        DETECT TRENDS BY ANALYSIS OF ACCIDENT, INCIDENT, AND  
DISCREPANCY DATA AND DETERMINE AND IDENTIFY CORRECTIVE ACTION FOR  
ROTORCRAFT SAFETY-RELATED PROBLEMS.

-----  
STATUS:              THIS IS A CONTINUOUS EFFORT INVOLVING THE MAINTENANCE OF THE  
ACCIDENT, INCIDENT, AND DIFFICULTY DATA BASES AND THE ANALYSIS OF THE DATA  
TO IDENTIFY SAFETY RELATED ROTORCRAFT PROBLEMS.

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REMARKS/NOTES:      MONITOR AND ANALYZE ROTORCRAFT DATA ON A CONTINUOUS BASIS.  
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PROJECT TITLE: TERPS CHAPTER 11 FAATC CONVENTIONAL NAVAIDS  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS

RESUME DATE: 01/13/87 LAST REVISION: 06/19/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: KESSINGER, WILLIAM, AVN-210 (405) 686-4164 \*  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: TO DETERMINE ANY REVISIONS NECESSARY TO THE  
 "RECOMMENDED MAXIMUM" VALUES CONTAINED IN CHAPTER 11 OF TERPS.

REQUIREMENT: DESIGN "RECOMMENDED MAXIMUM" HELICOPTER SIAPS, FLIGHT CHECK  
 AND TRACK AGENCY OWNED/LEASED AIRCRAFT WITH INDUSTRY SUBJECT PILOTS FOR  
 DATA BASE, PERFORM STATISTICAL ANALYSIS, AND DETERMINE ADEQUACY OF CURRENT  
 CHAPTER 11.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
DEVELOP SIAPS	/	/	12/31/83
TRACK HELICOPTERS	/	/	12/31/83
COLLECT STATISTICS AND ANALYZE	/	/	03/31/84
COMPARE TO CH. 11 AND REVISE IF REQUIRED	/	/	02/28/85

STATUS: IN WORK. THIS RESUME IS CONTINUED IN THIS EDITION FOR \*  
 ACCOUNTABILITY ONLY. IT WILL BE DELETED IN THE NEXT EDITION. \*

REMARKS/NOTES: THIS PROJECT WAS COMBINED WITH AVS-82-021-M AND SHOULD NOT \*  
 BE TRACKED SEPARATELY. (SEE AVS-82-021-M.) \*



PROJECT TITLE: TERPS CHAPTER 11 MLS COLLOCATED SITE  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS

RESUME DATE: 01/13/87 LAST REVISION: 08/18/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: KESSINGER, WILLIAM, AVN-210 (405) 686-4164  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: DEVELOP COLLOCATED MLS CRITERIA.

REQUIREMENT: SITE COLLOCATED MLS AT HELIPAD BASED ON FAATC SITING  
 DETERMINATION, DESIGN HELICOPTER SIAPS BASED ON CURRENT HELICOPTER TERPS,  
 OTHER MLS TERPS, OTHER MLS TERPS PROJECTS, USING INDUSTRY PILOTS.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
DEFINE SITING REQUIREMENTS	/	/	12/31/83
DESIGN SIAPS FOR STRAIGHT-IN APP. OFFSET APP.	/	/	12/31/83
TRACK HELICOPTERS	/	/	11/30/84
COLLECT STATISTICS AND ANALYZE	05/31/84	02/28/86	02/28/86*
DEVELOP MLS CRITERIA	01/31/85	04/30/87	04/30/87*
COORDINATE AND PUBLISH NOTICE	11/15/87		*
INCORPORATE CRITERIA IN TERPS	11/15/88		*

STATUS: INCORPORATED IN AVS-82-023-M, APRIL 17, 1987.

REMARKS/NOTES: THIS RESUME IS CONTINUED IN THIS EDITION FOR ACCOUNTABILITY  
 ONLY. IT WILL BE DELETED IN THE NEXT EDITION.

AVS RESUME

AVS-82-025-M

PROJECT TITLE: TERPS CHAPTER 11 AIRBORNE RADAR APPROACHES-(ARA) \*  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS

RESUME DATE: 01/16/87 LAST REVISION: 08/18/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: KESSINGER, WILLIAM, AVN-210 (405) 686-4164  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: TO INCORPORATE AIRBORNE RADAR APPROACHES (ARA) CRITERIA  
 IN TERPS AND EXPAND ARA.

REQUIREMENT: REWRITE CRITERIA IN TERPS FORMAT, COORDINATE WITH INDUSTRY  
 AND INCORPORATE IN TERPS.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
ARA (REWRITTEN IN TERPS FORMAT)	/	/	01/31/85

STATUS: ON HOLD.

REMARKS/NOTES: PROJECT ON HOLD DUE TO FAA/INDUSTRY WORKING ON NEW ARA/LORAN  
 -C OFFSHORE TECHNIQUES FOR APPROACHES TO OFF-SHORE PLATFORMS.--HEDA CRITERIA \*  
 IS NO LONGER BEING PURSUED AS ARA AND OFFSHORE STANDARD APPROACH PROCEDURES \*  
 (OSAP) PRESENT MUCH GREATER USABILITY. \*

PROJECT TITLE: TERPS CHAPTER 11 RNAV  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS

RESUME DATE: 01/16/87      LAST REVISION: 06/19/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: KESSINGER, WILLIAM, AVN-210 (405) 686-4164 \*  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: TO INCORPORATE HELICOPTER RNAV IN TERPS. \*

REQUIREMENT: ADAPT RNAV CRITERIA TO HELICOPTER CHARACTERISTICS, PUT IN  
 TERPS FORMAT, COORDINATE WITH INDUSTRY AND INCORPORATE IN TERPS.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.    REVISED    ACTUAL		
MODIFY RNAV/TERPS CRITERIA-(TERPS CH. 15)	01/31/85	06/30/86	06/30/86*
COORDINATION OF NEW CRITERIA W/SIGNATOR/USERS	11/30/87		*
PUBLICATION IN TERPS DOCUMENT (CH 15)	03/31/88		*
DRAFT HELICOPTER RNAV CRITERIA	03/31/88		*
COORD. OF HELI. CRITERIA W/SIGNATORIES/USERS	J9/30/88		*
PUBLICATION IN TERPS DOCUMENT (CH 11)	01/31/89		*

STATUS: IN WORK. \*

REMARKS/NOTES: HELICOPTER SPECIFIC CRITERIA WILL CLOSELY FOLLOW  
 PUBLICATION OF RNAV CRITERIA FOR FIXED-WING AIRCRAFT. \*



PROJECT TITLE: TERPS CHAPTER 17 EN ROUTE RNAV  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS

RESUME DATE: 01/22/87 LAST REVISION: 08/21/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: KESSINGER, WILLIAM, AVN-210 (405) 686-4164  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: TO INCORPORATE RNAV CRITERIA INTO TERPS.

REQUIREMENT: REWRITE CRITERIA INTO TERPS FORMAT AND INCORPORATE INTO TERPS.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.	REVISED	ACTUAL
REWRITE CRITERIA	/ /		03/31/85
CRITERIA INCORPORATED IN TERPS	06/30/86	01/31/87	

STATUS: ON HOLD. A NEW SCHEDULE HAS NOT BEEN DEVELOPED. STATUS \*  
 DOES NOT EFFECT USE. \*

REMARKS/NOTES: AC 90-45A, IFR APPROVAL OF AREA NAVIGATION SYSTEMS FOR USE IN THE NATIONAL AIRSPACE SYSTEM, PROVIDES CURRENT CRITERIA. INCORPORATION INTO TERPS DOCUMENT IS BASED UPON PRIORITY WITH OTHER WORK.





AVS RESUME

AVS-82-040-M

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PROJECT TITLE: HELICOPTER SAFETY PROGRAM  
PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS  
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RESUME DATE: 01/30/87 LAST REVISION: 06/30/87 REACTIVATED:

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STAFF: PRINCIPAL SPECIALIST: AARON, SAM, AFS-810, (202) 267-3818  
TEAM LEADER :  
WRITER/EDITOR :  
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OBJECTIVE: TO PRODUCE A FILM THAT WILL REACH HELICOPTER PILOTS ENGAGED  
IN EXTERNAL LOAD AND OIL INDUSTRY OPERATIONS AND EDUCATE THEM FOR A  
SAFER OPERATION.

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REQUIREMENT: TO ESTABLISH FUNDING AND FILM FOOTAGE FOR THE PROJECTS.  
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MILESTONE SCHEDULE COMPLETION DATES: SCHED. REVISED ACTUAL  
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HELICOPTER FILM 03/31/85 04/30/86  
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STATUS: NO FUNDING AVAILABLE. NO ESTIMATED COMPLETION DATE CAN \*  
BE ESTIMATED. \*

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REMARKS/NOTES: THE SLIPPAGE IN MILESTONE SCHEDULE IS DUE TO OTHER  
FUNDING PRIORITIES.  
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AVS RESUME

AVS-82-090-M

PROJECT TITLE: ROTORCRAFT AIRMEN CERTIFICATION  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS

RESUME DATE: 01/30/87      LAST REVISION: 05/19/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: FRED LAIRD, AVN-130 (405) 686-4151 \*  
 TEAM LEADER : WALKER , G      AVN-130 (405) 686-4149  
 WRITER/EDITOR :

OBJECTIVE: TO REDUCE THE NUMBER OF ROTORCRAFT AIRMEN-RELATED ACCIDENTS AND INCIDENTS BY UPDATING AIRMEN CERTIFICATION MATERIAL AND TECHNIQUES.

REQUIREMENT: TO REVISE AIRMEN WRITTEN TESTS, PRACTICAL TEST STANDARDS, RELATED HELICOPTER HANDBOOKS, AND OTHER ASSOCIATED AIRMEN CERTIFICATION ADVISORY CIRCULARS.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.    REVISED    ACTUAL		
AC 61-13B, BASIC HELICOPTER HANDBOOK	12/31/87	12/31/88	
AC 61-27C, INSTRUMENT FLYING HANDBOOK	12/31/88		
FAA-S-8081, HELICOPTER PRACTICAL TEST STDS.	08/01/87		
FAA-T-8080, HELICOPTER WRITTEN TEST BOOK	03/01/88		

STATUS: ALL PROJECTS FALLING BEHIND OR ON HOLD DUE TO PERSONNEL SHORTAGE AND/OR PERSONNEL CUTS, AND LACK OF FUNDS FOR CONTRACTING SPECIFIC PROJECTS.

REMARKS/NOTES: MAXIMUM EFFORT IN THE AREA OF PRACTICAL TEST STANDARDS AND AIRMEN WRITTEN TEST BOOKS IS ONGOING. ADVISORY CIRCULAR HANDBOOKS ARE ON HOLD PENDING FUNDING.

PROJECT TITLE: ROTORCRAFT REGULATORY REVIEW PROGRAM NOTICE NO. 5  
 (OPERATIONS AND MAINTENANCE)  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS

RESUME DATE: 01/30/87      LAST REVISION: 06/19/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: CLEMENS, MARIAN, AFS-850, (202) 267-3829  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: THIS IS NOTICE NO. 5 OF A SERIES OF SIX RULES/NOTICES TO BE ISSUED AS PART OF THE FAA'S COMPREHENSIVE ROTORCRAFT REGULATORY REVIEW PROGRAM. THE FAA HAS PREVIOUSLY ISSUED RULE NO. 1 & RULE NO. 2. THESE RULES/NOTICES CONTAIN PROPOSALS WHICH WOULD AMEND AND UPDATE THE OPERATIONS AND MAINTENANCE REQUIREMENTS PERTAINING TO ROTORCRAFT AND COVERED IN PARTS 43, 45, 61, 91, 121, 133, AND 135 OF THE FEDERAL AVIATION REGULATIONS. PART 1 WOULD ALSO BE AMENDED TO ADD A DEFINITION OF A CLASS D ROTORCRAFT-LOAD COMBINATION. THIS NOTICE IS BASED ON A NUMBER OF PROPOSALS DISCUSSED AT THE ROTORCRAFT REGULATORY REVIEW CONFERENCE HELD DECEMBER 10-14, 1979, IN NEW ORLEANS, LA, AND AT THE ROTORCRAFT REGULATORY REVIEW MEETING HELD AUGUST 18-20, 1980, IN WASHINGTON, DC. THESE PROPOSALS OFFER REGULATORY ALTERNATIVES WHICH COULD RESULT IN CHANGES TO PRESENT OPERATIONS AND MAINTENANCE REGULATIONS THAT THE PUBLIC OR THE FAA BELIEVES ARE NECESSARY.

REQUIREMENT: REPEATED REQUESTS FROM THE ROTORCRAFT OWNERS/OPERATORS AND FAA FIELD REPRESENTATIVES TO CHANGE THESE PARTS TO APPLY SPECIFICALLY TO ROTORCRAFT, RATHER THAN TAKING FIXED-WING REGULATIONS AND ARBITRARILY ASSIGNING THEM TO ROTORCRAFT. THIS DEFEATED MANY OF THE INHERENT FUNCTIONAL CHARACTERISTICS OF THE ROTORCRAFT.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.    REVISED    ACTUAL		
NPRM PUBLISHED IN FEDERAL REGISTER	/	/	03/31/85
FINAL RULE IN FEDERAL REGISTER	08/31/86		11/07/86

STATUS: PROJECT CLOSED. THIS RESUME IS CONTINUED IN THIS EDITION \*  
 FOR ACCOUNTABILITY ONLY. IT WILL BE DELETED IN THE NEXT EDITION. \*

REMARKS/NOTES: PUBLISHED IN THE FEDERAL REGISTER NOVEMBER 7, 1986,  
 WITH AN EFFECTIVE DATE OF JANUARY 6, 1987.

AVS RESUME

AVS-82-110-M

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PROJECT TITLE: ENGINEERING ASSISTANCE TO THE ROTORCRAFT CERTIFICATION  
DIRECTORATE  
PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS  
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RESUME DATE: 01/30/87      LAST REVISION: 08/18/87      REACTIVATED:

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STAFF: PRINCIPAL SPECIALIST: SANDERS, B.J.    AVN-110    (405) 686-4374  
      TEAM LEADER                    : FOX , D                    AVN-110    (405)686-4374  
      WRITER/EDITOR                 :  
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OBJECTIVE:            RESPOND TO ROTORCRAFT CERTIFICATION DIRECTORATE NEEDS  
RELATIVE TO THE SERVICE HISTORY AND PERFORMANCE OF EQUIPMENT.  
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REQUIREMENT:        TO IDENTIFY, BY ROTORCRAFT MODEL, SYSTEMS WHICH EXHIBIT  
EITHER LONG OR SHORT MEAN TIME BETWEEN FAILURES (MTBF'S). THE REASONS FOR  
THESE TRENDS NEED TO BE KNOWN BY OPERATORS AND MANUFACTURERS AND  
CORRECTIVE ACTION TAKEN IF NECESSARY.  
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STATUS:                THIS IS A CONTINUOUS EFFORT INVOLVING PROCESSING OF  
MANDATORY FOREIGN SERVICE BULLETINS, REVIEW OF OPERATIONAL HISTORY BY  
ROTORCRAFT MODEL, AND SPECIAL STUDIES OF ROTORCRAFT SYSTEMS.  
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PROJECT TITLE: ROTORCRAFT ACCIDENT ASSESSMENT  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS

RESUME DATE: 02/03/87 LAST REVISION: 08/18/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: OSTROWSKI, DAVE, AWS-110, (202) 267-9568  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: REDUCTION OF ROTORCRAFT ACCIDENTS

REQUIREMENT: TO ASSESS THE MAJOR BASIC CAUSES OF ROTORCRAFT ACCIDENTS TO DETERMINE THE AREAS WHERE THE MOST EFFECTIVE CORRECTIVE ACTION CAN BE TAKEN CONSISTENT WITH IMPROVING SAFETY WITHOUT UNDUE PUBLIC OR INDUSTRY BURDEN.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
INITIATE OVERALL ASSESSMENT	/	/	09/30/83
IDENTIFY MAJOR BASIC ACCIDENT CAUSES	10/31/83	03/31/86	09/30/86*
START IMPLEMENTING CORRECTIVE ACTION	11/30/83	07/31/86	

STATUS: FINAL REPORT HAS BEEN PREPARED. ACCIDENT CAUSES, REMEDIES \* IDENTIFIED. CORRECTIVE ACTION BEING PURSUED THROUGH PROJECT AVS-83-141-M AND \* ONGOING ROTORCRAFT AIRWORTHINESS ACTIVITIES IN THE ROTORCRAFT CERTIFICATION \* DIRECTORATE. THIS PROJECT IS CANCELED. \*

REMARKS/NOTES: SOME CONTINUING EFFORTS IN THIS AREA ARE SAFETY DATA \* ANALYSIS, FOREIGN SERVICE DATA REVIEW, AND ROTORCRAFT DIRECTORATE \* REVIEW/ISSUANCE OF AD'S. \*



PROJECT TITLE: ROTORCRAFT ICING RESEARCH  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS

RESUME DATE: 02/03/87      LAST REVISION: 08/18/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: ADAMS, RICHARD, AWS-104, (202) 257-9586  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: DEVELOP THE TECHNICAL BASIS FOR UPDATE OF ICING CERTIFICATION STANDARDS, PROCEDURES, AND GUIDELINES, AND MAINTAIN EXPERTISE THROUGH RESEARCH IN: (1) ICING ATMOSPHERIC CRITERIA, (2) ICING TEST AND OPERATIONAL TECHNOLOGY, (3) ICE PROTECTION SYSTEM TECHNOLOGY, AND (4) ICING SIMULATION TECHNOLOGY.

REQUIREMENT: AIRCRAFT GROWTH PROJECTIONS, TECHNOLOGY ADVANCEMENTS, CURRENT CERTIFICATION DIFFICULTIES, AND ACCIDENT STATISTICS ARE IN COMBINATION INDICATIVE OF FUTURE ICING CERTIFICATION AND GROUND AND FLIGHT OPERATIONAL PROBLEMS. INDUSTRY HAS CHALLENGED ICING ATMOSPHERIC CRITERIA, EXORBITANT COST AND TIME REQUIRED FOR ICING CERTIFICATION LACK OR OBSOLESCENCE OF DESIGN AND CERTIFICATION GUIDANCE AND THE LACK OF\*

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.    REVISED    ACTUAL		
ICING ATMOSPHERIC CRITERIA	12/31/91	12/31/88	
AIRCRAFT ICING HANDBOOK-(CONTRACTOR INPUT)	06/30/86	01/31/88	*
HANDBOOK UPDATES (BIANNUALLY)	06/30/89		

STATUS: CURRENT EFFORTS INCLUDE JOINT FAA/ARMY TESTS, FAA/NASA EFFORTS IN ICING TECHNOLOGY, FAA/DOD/NASA EFFORTS IN ATMOSPHERIC CRITERIA, ONGOING EFFORT IS IN ACCORDANCE WITH FAA TECHNICAL CENTER E&D AIRCRAFT ICING PLAN, DATED 8/83. THE AIRCRAFT ICING CERTIFICATION STEERING GROUP IS\*\*

REMARKS/NOTES: THIS EFFORT WAS INITIATED IN 1978 AS A HELICOPTER ICING RESEARCH PROGRAM AND NOW INCLUDES FIXED-WING AIRCRAFT RESEARCH AS WELL. SIGNIFICANT CONTRIBUTIONS HAVE BEEN MADE TOWARD DEVELOPMENT OF HELICOPTER ICING CERTIFICATION STANDARDS AND PROCEDURES. FAR 27 AND 29 RULES BECAME EFFECTIVE ON 3/2/83. ADVISORY CIRCULAR NO. 29-2 FOR CERTIFICATION OF TRANSPORT CATEGORY ROTORCRAFT BECAME EFFECTIVE ON 5/20/83. SEE RESUME ADL-83-100-3 FOR RELATED ICING ACTIVITIES.

\*STANDARDIZATION IN THE AIRCRAFT ICING CERTIFICATION PROCESS. THIS REQUIREMENT INCLUDES ALL AIRCRAFT TYPES (LARGE, SMALL, AND ROTORCRAFT).  
 \*\*CURRENTLY EMBELLISHING THE SPECIFIC NEED UNDER THESE TWO REGULATORY AND GUIDANCE ORIENTED PROGRAMS.



PROJECT TITLE: ROTORCRAFT ADVANCED FLIGHT CONTROLS/DISPLAY SYSTEMS  
CRITERIA

PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS

RESUME DATE: 02/03/87 LAST REVISION: 08/18/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: HONAKER, JIM, ASW-111 (817) 624-5109  
TEAM LEADER :  
WRITER/EDITOR :

OBJECTIVE: DEVELOP CRITERIA AND GUIDANCE MATERIAL FOR AIRWORTHINESS  
CERTIFICATION OF ROTORCRAFT ADVANCED FLIGHT CONTROLS/DISPLAY SYSTEMS.

REQUIREMENT: THE SOUTHWEST REGION, AIRCRAFT CERTIFICATION DIVISION (BY  
LETTER OF MAY 14, 1984, SUBJECT: R&D NEEDS FOR THE PERIOD 1985-1990)  
IDENTIFIED REQUIREMENTS FOR R&D TO HELP DEVELOP ROTORCRAFT AIRWORTHINESS  
CERTIFICATION CRITERIA IN 7 AREAS. THIS PROJECT ADDRESSES 3 OF THESE:  
ROTORCRAFT ADVANCED FLIGHT CONTROLS (I.E., SIDEARM CONTROL/FLY-BY-WIRE),  
DISPLAYS (E.G., FLIGHT DIRECTORS), AND SENSORS (E.G. FLIR).

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
PROJECT PLAN	06/30/85	12/31/87	*
BEGIN PHASE I (FLY-BY-WIRE) DATA COLLECTION	10/31/85	09/30/87	*
FINAL REPORT, PHASE I	10/31/86	06/30/88	*
BEGIN PHASE II (DISPLAYS, ETC.)	09/30/86	06/30/88	*
FINAL REPORT, PHASE II	09/30/87	12/30/88	*
BEGIN PHASE III (SENSORS (FLIR ETC) DATA COLL	03/31/87	04/28/89	*
FINAL REPORT, PHASE III	01/31/88	07/31/90	*

STATUS: PROGRAM DIRECTIVES ESTABLISHED, CANADIAN COOPERATION  
OBTAINED, IN PROCESS OF DETERMINING NEEDS.

REMARKS/NOTES: SEE RESUME AVS-85-203-M, AVS-84-230-M, AND ADL-82-090-M FOR  
RELATED EFFORTS.--ASW IS WORKING WITH ANM TO USE ANM STANDARDS DEVELOPED FOR  
THE AIRBUS 320 FLY-BY-WIRE (FBW) SYSTEM. THIS PROGRAM MAY BE USED TO  
EVALUATE THESE FBW STANDARDS FOR ROTORCRAFT BEFORE PROCEEDING WITH  
PHASES II AND III.





PROJECT TITLE: ROTORCRAFT IFR APPROACH MINIMUMS  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AVIATION STANDARDS PROGRAMS

RESUME DATE: 02/09/87 LAST REVISION: 05/05/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: DAVIS, JERRY, AFS-200, (202) 267-8452 \*  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: NEAR-TERM: TO DEVELOP THE AIRWORTHINESS AND OPERATIONAL APPROVAL CRITERIA TO PERMIT ROTORCRAFT TO OPERATE TO REDUCED IFR APPROACH MINIMUMS IN AN AIRPORT RUNWAY ENVIRONMENT.  
 LONG-TERM: TO DEVELOP THE AIRWORTHINESS AND OPERATIONAL APPROVAL CRITERIA TO PERMIT ROTORCRAFT TO OPERATE TO IFR APPROACH TO HOVER AND TAKEOFF IN A HELIPORT ENVIRONMENT.

REQUIREMENT: IN ORDER TO FULLY UTILIZE THE CAPABILITIES OF ROTORCRAFT AND TO PERMIT INDUSTRY TO DEVELOP THE CAPABILITY TO MEET THE DEMANDS OF A MODERN AIR TRANSPORTATION SYSTEM, PROVISIONS MUST BE MADE FOR IFR LANDINGS AND TAKEOFFS OF ROTORCRAFT SIMILAR TO CAPABILITIES NOW AVAILABLE FOR AIRPLANES.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
NEAR-TERM (CAT IIIA): DRAFT GUIDANCE	/	/	11/30/84
PUBLISH AC IN FEDERAL REGISTER FOR COMMENT	04/30/86	09/30/87	*
ISSUE CAT IIIA AIRWOR. & OPER. APPROVAL CRIT.	11/30/85	06/30/88	*

STATUS: PROGRAM IN PROCESS.

REMARKS/NOTES: KEY PROGRAM CONCEPTS INCLUDE THE SAME LEVEL OF SAFETY AS SIMILAR OPERATIONS WITH AIRPLANES UTILIZING AS MUCH EXISTING CRITERIA AS POSSIBLE, CONSIDERATION OF FULL RANGE OF REQUIREMENTS (INCLUDING AIRBORNE, GROUND, TRAINING, AIRWORTHINESS, ETC.). SUBSEQUENT MILESTONES FOR NEAR-TERM (CAT IIIA) FOLLOWING ISSUANCE OF CRITERIA BY FAA MUST BE INITIATED OUTSIDE FAA. FOR EXAMPLE, PREPARATION OF A PROJECT PLAN FOR THE INITIAL STC WOULD TAKE 90 DAYS FROM RECEIPT OF A REQUEST FROM INDUSTRY. COMPLETION OF THE STC WOULD TAKE AN ADDITIONAL 90 DAYS. THE STC COULD THEN BE ISSUED WITHIN 30 DAYS, AND ISSUING THE FIRST CAT IIIA OPERATIONAL APPROVAL COULD BE DONE WITH AN ADDITIONAL 30 DAYS AND WOULD REQUIRE A REQUEST FROM AN OPERATOR. LONG-TERM (CAT IIIB) MILESTONES WOULD BE SIMILAR TO THOSE FOR CAT IIIA, BUT WOULD BE TO HELIPADS/HELIPORTS VS. RUNWAYS.





## ROTORCRAFT CERTIFICATION DIRECTORATE SUMMARY

### 1. Major Accomplishments Include:

- (1) Many rotorcraft were certificated, including single-pilot IFR and combination dual or single IFR certifications. Assisted in certification of many of the SFAR 29 IFR approvals until Rule 1 (with IFR provisions) was released.
- (2) Update of all rotorcraft standards initiated (Rotorcraft Regulatory Review). NPRM 80-25 (NPRM 1) issued; Rule 1 effective 3/3/83 (Certification standards applicability, IFR, Icing). NPRM 2 issued (flight and systems criteria); final rule published 11/30/84, effective date 12/6/84. NPRM 3 for propulsion was published in the Federal Register on November 27, 1984. NPRM 4 for structures is in final processing for coordination and publication.
- (3) AC 29-XX was released in final form on 5/20/83 as an advanced copy of AC 29-2. Government Printing Office copy has been distributed. Change 1 to AC 29-2 was issued 11/19/84. Change 2 to AC 29-2 was issued 5/28/85. The initial issue of AC 27-1 (the comprehensive certification guide for normal category helicopters) was issued 8/29/85. Public meeting to address AC 29-2, Revision 3, and AC 27-1, Revision 1, was held on March 5-6, 1987.
- (4) Aerospatiale SA-365N-1, AS-350B-1, and AS-355F-2 and Sikorsky S-76B certificated.
- (5) Processed 49 Airworthiness Directive actions for both foreign and domestic rotorcraft in FY-86. Worked with operators and manufacturers to obtain flight safety with minimum adverse impact on operations.
- (6) Published NPRM on Transport Rotorcraft Structural Fatigue and Damage Tolerance (FAR 29.571) with associated draft AC 29.571-X. Held second public meeting.
- (7) The first approval for helicopter operation in supercooled icing conditions was issued for the Aerospatiale AS-332 in March 1984.
- (8) Completed and published in the Federal Register, May 1984, a summary of the rotorcraft industry's five highest safety priorities that can be addressed through airworthiness regulations.
- (9) Full Authority Digital Engine Controls (FADEC) have been approved for one helicopter installation and three others have made application. Two of the significant issues were software criticality and lightning strike protection. Advisory material is now provided in Change 2 to AC 29-2 on lightning strike protection.

**ROTORCRAFT  
CERTIFICATION DIRECTORATE PROGRAMS**

- (10) Electronic Flight Instrument System (EFIS)—Use of computer generated CRT displays for flight instruments represents new technology in civil helicopter cockpits. EFIS systems of two different manufacturers have been approved in the Sikorsky Model S-76. One system has been approved in the Bell 412 and another system has been approved in the Westland 30. Advisory material has been prepared with the maximum possible standardization with the transport airplane directorate.
- (11) An ANPRM on Transport Rotorcraft Performance was published, and the NPRM has been drafted and is in coordination.
- (12) The Helicopter Minimum Flightcrew ANPRM was published and a public meeting held. Based on the public meeting, the proposal has been withdrawn.
- (13) Issued an Instrument Flight NPRM proposing a method of reduction of approved instrument approach speed. Public meeting was held to discuss the proposal.
- (14) Developed an NPRM for occupant restraint compatible with information derived from participation with the General Aviation Safety Panel (GASP). The NPRM was published in June 1987. This action was delayed by the necessity for rewriting the economic analysis (see Resume ASW-84-011-M).

## 2. Current Projects Include:

- (1) The continuation of Rotorcraft Regulatory Review (NPRM's 3 and 4) (see Resumes ASW-82-114-M and ASW-82-115-M).
- (2) Continuation of Advisory Circular 29-2 effort (updating and adding additional sections). Plan to complete AC 29-2 to cover all of FAR Part 29 and complete AC 27-1 for all of FAR Part 27 (see Resume ASW-83-020-M).
- (3) A public meeting with participation of domestic and foreign manufacturers and Foreign Airworthiness Authorities was held April 30 through May 2, 1986, to discuss the 92 European Airworthiness Authorities Steering Committee (AASC) proposals for FAR Part 29. The consensus of the meeting was 22 of the proposals have merit for publication as NPRM's. The four projects by specialty area have been combined into one NPRM including all 22 proposals. Also, it was agreed that 16 of the AASC proposals would be best handled as changes or additions to AC 29-2. Any changes will be incorporated by Change 4 to AC 29-2.
- (4) New certification programs: Agusta AS61N1 (Silver); Agusta/Westland EH-101; Bell 400A; Sikorsky CS-70C; S-76 with Turbomeca Arriel 1C1 engines; MBB BK-117A-4 and BO-108; Aero Design Enterprises UH-1; Westland Series 200; Rogerson Hiller RH-1100; Boeing Vertol 360; and Bell 900 Tilt Rotor.

- (5) The Powered Lift Interim Airworthiness Criteria were published and a public meeting was held June 23-26, 1987, to consider issues and to establish working groups as necessary to resolve the issues (see resume ASW-83-014-M).
- (6) Participated in the GASP committee involving fuel crashworthiness and expect to resume some of this rulemaking action that was set aside from the NPRM 3 proposals created by a lack of economic data. The crash resistant fuel systems NPRM scheduled to be published in December 1986 has been delayed by other higher priority work (see Resume ASW-85-113-M).
- (7) An NPRM has been drafted to require containment of turbine engine bursts and was scheduled to be published in late-1986; however, it has been delayed by the time required to develop the basic data for the economic analysis (see Resume ASW-84-111-M).
- (8) Processing Aerospace Industries Association's petition for rulemaking for new one-engine inoperative rating of helicopter engines and resultant improved productivity. An NPRM was scheduled to be published in February 1987; however, it has been delayed by support resources limitations (see Resume ASW-83-018-M).
- (9) Rotorcraft review final rule number 3, for propulsion systems was scheduled to be published in October 1986; however, it has been delayed by support resources limitations (see Resume ASW-82-114-M).
- (10) Rotorcraft review NPRM number 4 was scheduled to be published by February 1986; however, it has been delayed by support resources limitations (see Resume ASW-82-115-M).
- (11) The structural fatigue and damage tolerance NPRM was published and a public meeting was held in March 1987. The final rule will be developed with consideration of comments from the public meeting. An accompanying advisory circular will be published simultaneously (see Resume ASW-82-013-M).
- (12) The Helicopter Instrument Flight NPRM was published and a public meeting was held in March 1987. The final rule will be developed with consideration of comments from the public meeting (see Resume ASW-84-112-M).

### 3. Problems/Needs and Actions Being Taken:

The rotorcraft accident rate needs to be reduced. Each accident is being assessed for possibility of noncompliance with FAR Parts 27 and 29, and corrective action is being initiated with the manufacturers where justified.

The crashworthiness of rotorcraft needs to be improved. Rulemaking projects are in process to increase crashworthiness.

The Directorate is continuing its efforts to coordinate with the JAR 29 group to incorporate their proposals into FAR Part 29. Considerable progress is being made through advisory circulars in guiding and directing foreign manufacturers and airworthiness authorities in methods of compliance with FAR Parts 27 and 29. This effort will assure more uniformity in compliance, fairness, and equal competition for the manufacturers. There are still a number of reserved sections in the advisory circulars. Development of material for these sections is a high priority item.

A member of the Directorate Staff is participating with industry committees and with other directorates to assure cross directorate uniformity in lightning standards. Additional attention to this area is planned as better characterization and methods of protection are developed.

N	H	C	<u>Southwest Region (ASW)</u>	
		x	ASW-82-010-M	Develop Rotorcraft Airworthiness Standards
		x	ASW-84-011-M	Occupant Restraint in Normal and Transport Category Rotorcraft
		x	ASW-84-012-M	Helicopter Minimum Flightcrew
		x	ASW-82-013-M	Transport Rotorcraft Structural Fatigue and Damage Tolerance
		x	ASW-83-014-M	Advanced V/STOL Rotorcraft Standards
		x	ASW-83-016-M	Transport Category Rotorcraft Performance
		x	ASW-83-017-M	Rotorcraft Certification Requirements Coordination with European AASC
		x	ASW-83-018-M	Revised One-Engine-Inoperative (OEI) Power Rating for Rotorcraft
		x	ASW-83-020-M	Rotorcraft Certification Guidance
		x	ASW-82-021-M	Advanced Electronic Helicopter Standards
		x	ASW-82-022-M	Rotorcraft Handling Qualities Assessment
			* ASW-82-030-M	Rotorcraft Type Certification
		x	ASW-84-111-M	Turbine Burst Protection for Transport Category Helicopters
		x	ASW-84-112-M	Helicopter Instrument Flight
		x	ASW-85-113-M	Crash Resistant Fuel Systems
		x	ASW-82-114-M	Rotorcraft Regulatory Review Program Notice No. 3
			ASW-82-115-M	Regulatory Review Program Notice No. 4 (Airframe)

\* = Long-term, Continuing Program/Project  
 N = National Airspace System  
 H = Heliports  
 C = Certification

AVS RESUME

ASW-82-010-M

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PROJECT TITLE: DEVELOP ROTORCRAFT AIRWORTHINESS STANDARDS  
PROJECT CATEGORY: ROTORCRAFT MASTER PLAN CERTIFICATION DIRECTORATE PROGRAMS  
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RESUME DATE: 02/10/87      LAST REVISION: 05/21/87      REACTIVATED:

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STAFF: PRINCIPAL SPECIALIST: SHAPLEY, JOHN, ASW-110, (817) 624-5110      \*  
      TEAM LEADER               : PLUMMER, T               ASW-111    (817) 624-5111  
      WRITER/EDITOR             :

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OBJECTIVE:           KEEP FAR PARTS 27 AND 29 CURRENT WITH THE  
STATE-OF-THE-ART IN ROTORCRAFT MATERIALS, SYSTEMS, AND DESIGN TECHNIQUES.  
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REQUIREMENT:        PROVIDE A REGULATORY BASIS TO ASSURE EFFICIENT  
CERTIFICATION OF SAFE ROTORCRAFT.  
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STATUS:              THIS IS A CONTINUAL PROCESS.  
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PROJECT TITLE: TRANSPORT CATEGORY ROTORCRAFT PERFORMANCE  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN CERTIFICATION DIRECTORATE PROGRAMS

RESUME DATE: 02/13/87 LAST REVISION: 09/09/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: SHAPLEY, JOHN, ASW-110, (817) 624-5110  
 TEAM LEADER : PLUMMER, T ASW-111 (817) 624-5111  
 WRITER/EDITOR : MYERS, D ASW-111 (817) 624-5118  
 HONAKER, J ASW-111 (817) 624-5109

OBJECTIVE: REVISE AND CLARIFY TRANSPORT ROTORCRAFT PERFORMANCE  
 AIRWORTHINESS STANDARDS AND TO ESTABLISH MINIMUM GRADIENTS OF CLIMB DURING  
 TAKEOFF.

REQUIREMENT: CURRENT FAR PART 29 PERFORMANCE REQUIREMENTS ARE  
 INSUFFICIENT, DO NOT INCORPORATE ESTABLISHED POLICY, AND LACK SEVERAL  
 SIGNIFICANT FACTORS NEEDED TO CLEARLY DEFINE PERFORMANCE REQUIREMENTS.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
PUBLICATION OF ANPRM IN FEDERAL REGISTER	06/30/83	10/15/85	10/17/85
PUBLICATION OF NPRM	12/31/83	09/30/88	*
PUBLICATION OF FINAL RULE	06/30/84	12/30/89	*

STATUS: SCHEDULE SLIPPAGE HAS OCCURRED DUE TO LARGE RULEMAKING  
 BACKLOG. NPRM HAS BEEN DRAFTED AND IS IN COORDINATION.

REMARKS/NOTES: SECTIONS AFFECTED:  
 29.51 TAKEOFF DATA: GENERAL  
 29.53 TAKEOFF: CATEGORY A  
 29.63 TAKEOFF: CATEGORY B  
 29.65 CLIMB: ALL ENGINES OPERATING  
 29.67 CLIMB: ONE ENGINE INOPERATIVE  
 29.71 HELICOPTER ANGLE OF GLIDE: CATEGORY B  
 29.73 PERFORMANCE AT MINIMUM OPERATING SPEED  
 29.75 LANDING  
 29.77 BALKED LANDING: CATEGORY A  
 29.79 LIMITING HEIGHTS-SPEED ENVELOPE  
 SLIPPAGE IN MILESTONE SCHEDULE IS DUE TO OTHER HIGHER REGULATORY PRIORITIES.



PROJECT TITLE: REVISED ONE-ENGINE-INOPERATIVE (OEI) POWER RATING FOR ROTORCRAFT  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN CERTIFICATION DIRECTORATE PROGRAMS

RESUME DATE: 02/13/87      LAST REVISION: 08/19/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: WELLS, WILBUR, ASW-111 (817) 624-5123  
 TEAM LEADER : PLUMMER, T ASW-111 (817) 624-5111  
 WRITER/EDITOR : MYERS, D ASW-111 (817) 624-5118

OBJECTIVE: TO PROVIDE A REGULATORY BASIS FOR QUALIFICATION OF ROTORCRAFT AND ROTORCRAFT ENGINES FOR OPTIONAL 30-SECOND/2-MINUTE OEI RATINGS FOR HELICOPTERS.

REQUIREMENT: REVISE PARTS 27, 29, AND 33 TO SET FORTH QUALIFICATION AND PERFORMANCE ASSOCIATED WITH OPTIONAL 30-SECOND/2-MINUTE OEI RATINGS FOR HELICOPTERS.

MILESTONE SCHEDULE	COMPLETION DATES: SCHEP.    REVISED    ACTUAL		
PETITION FROM AIA	/	/	09/30/84
FAA DIRECTORATE/JAR CONCURRENCE	03/31/85	07/30/88	
PRELIMINARY ECONOMIC ANALYSIS	05/31/85	03/30/89	
REGIONAL COUNSEL CONCURRENCE	07/31/85	09/30/87	
ISSUANCE (NPRM)	08/31/85	08/30/88	
GENERAL COUNSEL/OST/OMB ACTION	11/30/85	06/30/88	
PUBLISH IN FEDERAL REGISTER (NPRM)	12/15/85	09/15/88	
END OF COMMENT PERIOD	04/15/86	03/15/89	
PUBLISH IN FEDERAL REGISTER (FINAL RULE)	12/15/86	03/01/90	*

STATUS: DRAFT NPRM IS COMPLETE.

REMARKS/NOTES: THIS IS A JOINT RESPONSIBILITY OF THE ROTORCRAFT CERTIFICATION DIRECTORATE (SOUTHWEST REGION) AND THE ENGINE AND PROPELLER CERTIFICATION DIRECTORATE (NEW ENGLAND REGION), INVOLVING POTENTIAL CHANGES TO BOTH THE ROTORCRAFT AND ENGINE CERTIFICATION RULES. THIS PROJECT WAS INITIATED TO EVALUATE AN INFORMAL AIA PROPOSAL WHICH HAS EVOLVED INTO A PETITION FOR RULEMAKING. DOCKET NO. 24254. SCHEDULE SLIPPAGES ARE DUE TO OTHER HIGHER PRIORITY RULEMAKING ACTIVITY.

PROJECT TITLE: ROTORCRAFT CERTIFICATION GUIDANCE  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN CERTIFICATION DIRECTORATE PROGRAMS

RESUME DATE: 02/17/87      LAST REVISION: 05/21/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: SHAPLEY, JOHN, ASW-110, (817) 624-5110 \*  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: PROVIDE GUIDANCE MATERIAL TO THE PUBLIC ON ACCEPTABLE METHODS OF COMPLIANCE WITH FAR'S 27 AND 29.

REQUIREMENT: ACHIEVE UNIFORMITY AND EFFICIENCY IN ROTORCRAFT CERTIFICATION.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.    REVISED    ACTUAL		
PUBLISH PARTIAL AC 29-2	/	/	05/31/83
PUBLISH AC 29-2, CHANGE 3	01/31/85	01/31/88	*
PUBLISH AC 29-2, CHANGE 4	12/31/89		
PUBLISH PARTIAL AC 27-1	07/31/85	09/30/85	08/29/85
PUBLISH AC 27-1, CHANGE 1	01/31/86	12/31/88	
PUBLISH AC 27-1, CHANGE 2	12/31/89		

STATUS: PUBLIC MEETING HELD MARCH 5-6, 1986, TO DISCUSS DRAFTS OF AC 29-2, CHANGE 3, AND AC 27-1, CHANGE 1. \*

REMARKS/NOTES: VARIOUS SPECIALIZED AC'S AND CONTINUOUS AC 29-2, AC 27-1 UPDATES WILL BE PROCESSED CONTINUALLY. SLIPPAGE IN MILESTONE SCHEDULE IS DUE TO UNPREDICTABLE EMERGENCY WORKLOAD.



AVS RESUME

ASW-82-022-M

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 PROJECT TITLE: ROTORCRAFT HANDLING QUALITIES ASSESSMENT  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN CERTIFICATION DIRECTORATE PROGRAMS  
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RESUME DATE: 02/17/87      LAST REVISION: 08/19/87      REACTIVATED:

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 STAFF: PRINCIPAL SPECIALIST: SHAPLEY, JOHN, ASW-110, (817) 624-5110  
           TEAM LEADER                   : PLUMMER, T                   ASW-111   (817)624-5111  
           WRITER/EDITOR                :  
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OBJECTIVE:           DEVELOP HANDLING QUALITIES CERTIFICATION GUIDANCE  
 MATERIAL. ATTENTION WILL BE GIVEN TO STATIC LONGITUDINAL STABILITY, CONTROL  
 FORCES, AND STICK VS. SPEED GRADIENTS.  
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REQUIREMENT:       ASSURE APPROPRIATE PILOT LIMIT FORCES, ADVANCED  
 CONTROLLER CRITERIA, AND PILOT RESPONSES.  
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MILESTONE SCHEDULE	COMPLETION DATES:	SCHED.	REVISED	ACTUAL
AC 29-2, CHANGE 1		01/31/85		11/19/84
CHANGE TO ADVISORY CIRCULAR 29-2		01/31/87	01/31/89	*

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 STATUS:            ADVISORY CIRCULAR (AC) 29-2 PUBLISHED MAY 1983 WITH BASIC  
 HANDLING QUALITY INFORMATION. CHANGE 1 TO AC 29-2 ADDED INFORMATION ON  
 SECTION 29.141, GENERAL FLIGHT CHARACTERISTICS; SECTION 29.143,  
 CONTROLLABILITY AND MANEUVERABILITY; AND SECTION 29.161, TRIM.  
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REMARKS/NOTES:   ONGOING PROGRAM; NO SPECIFIC MILESTONES ARE ESTABLISHED  
 YET.  
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AVS RESUME

ASW-84-111-M

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 PROJECT TITLE: TURBINE BURST PROTECTION FOR TRANSPORT CATEGORY  
 HELICOPTERS  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN CERTIFICATION DIRECTORATE PROGRAMS  
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RESUME DATE: 06/02/87      LAST REVISION: 07/01/87      REACTIVATED:

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 STAFF: PRINCIPAL SPECIALIST: SHAPLEY, JOHN, ASW-110, (817) 624-5110  
           TEAM LEADER                 : PLUMMER , T                     ASW-111     (817)624-5111  
           WRITER/EDITOR            : MYERS , D                     ASW-111     (817)624-5118 \*  
   WELLS , W                     ASW-111     (817)624-5123  
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OBJECTIVE:                 TO PROVIDE A MEASURE OF SAFETY IN TRANSPORT HELICOPTERS  
 FROM THE PROBABLE EVENT OF UNCONTAINED ENGINE ROTOR BURST.

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 REQUIREMENT:            REVISE SECTION 29.901 TO REMOVE PARAGRAPH (C)(2). REVISE  
 SECTION 29.903 TO ADD A NEW PARAGRAPH THAT WOULD REQUIRE A MEANS TO  
 MINIMIZE THE HAZARDS OF ENGINE ROTOR BURST.  
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MILESTONE SCHEDULE	COMPLETION DATES: SCHED.    REVISED    ACTUAL		
DIRECTOR, SOUTHWEST REGION ISSUANCE (NPRM)	04/01/85	04/20/88	*
PUBLISH IN FEDERAL REGISTER (NPRM)	10/31/85	05/01/88	
END OF COMMENT PERIOD	12/31/85	11/01/88	
PUBLISH IN FEDERAL REGISTER (FINAL RULE)	08/31/86	11/01/89	

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 STATUS:                    FURTHER ECONOMIC DATA IS REQUIRED PRIOR TO NPRM. THE  
 TECHNICAL CENTER IS ASSISTING IN COLLECTION OF THIS DATA.  
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REMARKS/NOTES:          THIS PROJECT WAS ACTIVATED BY INSTRUCTIONS FROM THE  
 DIRECTOR, SOUTHWEST REGION, ASW-1, TO PROMULGATE A RULE CHANGE TO PROVIDE  
 PROTECTION FROM THE HAZARDS OF A TURBINE ENGINE BURST.  
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 PROJECT TITLE: REGULATORY REVIEW PROGRAM NOTICE NO. 4 (AIRFRAME)  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN CERTIFICATION DIRECTORATE PROGRAMS  
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RESUME DATE: 06/02/87      LAST REVISION: 09/09/87      REACTIVATED:

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 STAFF: PRINCIPAL SPECIALIST: SHAPLEY, JOHN, ASW-110, (817) 624-5110  
           TEAM LEADER               : PLUMMER, T                   ASW-111   (817) 624-5111  
           WRITER/EDITOR           : MYERS, D                   ASW-111   (817) 624-5118  
   MAJOR, J                   ASW-111   (817) 624-5117  
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OBJECTIVE:           THIS IS NOTICE NO. 4 OF A SERIES OF NOTICES ISSUED AS A PART OF THE FAA'S COMPREHENSIVE ROTORCRAFT REGULATORY REVIEW PROGRAM. THIS NOTICE CONTAINS PROPOSALS WHICH WOULD AMEND AND UPDATE THE AIRFRAME AND RELATED EQUIPMENT REQUIREMENTS IN PARTS 27 AND 29 OF THE FEDERAL AVIATION REGULATIONS.

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 REQUIREMENT:       REPEATED REQUESTS FROM ROTORCRAFT OWNERS/OPERATORS AND FAA FIELD REPRESENTATIVES TO CHANGE THESE PARTS TO APPLY SPECIFICALLY TO ROTORCRAFT RATHER THAN TAKING FIXED-WING REGULATIONS AND ARBITRARILY ASSIGNING THEM TO ROTORCRAFT. THIS DEFEATED MANY OF THE INHERENT FUNCTIONAL CHARACTERISTICS OF THE ROTORCRAFT.  
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MILESTONE SCHEDULE	COMPLETION DATES:	SCHED.	REVISED	ACTUAL
PUBLISH IN FEDERAL REGISTER (NPRM)		07/30/82	10/30/87	*
END OF COMMENT PERIOD		09/15/82	04/01/88	
PUBLISH IN FEDERAL REGISTER (RULE)		04/15/83	04/01/89	

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 STATUS:            SOME SCHEDULE SLIPPAGE HAS OCCURRED DUE TO LARGE RULEMAKING BACKLOG.  
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REMARKS/NOTES:    NOTICE NO. 4 CONCERNS THE PROPOSALS AND INFORMATION OR DATA SUBMITTED FOR RULEMAKING ACTION ON AIRFRAME AND RELATED EQUIPMENT REQUIREMENTS RESULTING FROM THE ROTORCRAFT REVIEW PUBLIC MEETING HELD IN DECEMBER 1979.  
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# **AIRPORTS PROGRAMS**

## AIRPORTS SUMMARY

### 1. Major Accomplishments Include:

- (1) The Office of Airports Standards has published and distributed over 33,000 copies of the current Heliport Design Guide (AC 150/5390-1B) which provides state-of-the-art guidance for heliport development.
- (2) The Office of Airport Planning and Programming has incorporated heliport requirements in the National Plan of Integrated Airport Systems. Approximately \$10 million in grants have been made for heliport development, system planning, and master planning under the Airport Improvement Program (AIP).
- (3) Airport Planning and Programming and its field elements have provided advisory services to local governments, engineers, architects, and planners on heliport planning, design, and construction and have worked with industry groups to set up local committees for stimulating interest in heliport development.
- (4) The Indianapolis, Indiana, heliport opened for VFR operations in December 1984. A VOR/DME nonprecision instrument approach was commissioned in August 1985.
- (5) The New Orleans, Louisiana, heliport opened for VFR operations in January 1986.
- (6) The Wall Street Heliport in New York opened for VFR operations in September 1987.

### 2. Current Projects Include:

- (1) The Airport Standards Office is revising the Heliport Design AC to include IFR design guidance (see Resume ARP-82-020-M).
- (2) Airport Planning and Programming and its regional counterparts are involved in various local and system-wide heliport planning efforts (see Resumes ARP-82-010-M through ARP-82-014-M).
- (3) Projects are underway to implement industry recommended improvements to the New Orleans heliport.
- (4) The FAA/Industry National Prototype Heliport Demonstration and Development Program has been transferred to the Associate Administrator for Airports.

3. Future Plans Include:

- (1) Airports Standards intends to periodically revise the Heliport Design Advisory Circular to incorporate new information and findings received from various sources (see Resume ARP-82-020-M).
- (2) Airport Planning and Programming will continue to promote the inclusion of heliports in urban transportation planning and the development of a system of public-use heliports. Funding will be available for heliport development and planning (see Resume ARP-82-010-M).
- (3) To continue FAA/Industry dialogue to refine approach airspace requirements for VFR and IFR operations.

4. Problems/Needs and Actions Being Taken:

- (1) The versatility of the helicopter, especially its ability to land and take off from a small area, has created expectations among helicopter owners and enthusiasts that public-use, city-center heliports would be available to exploit its capabilities. In reality, a system of city-center heliports has yet to be developed. This deficiency is related to developing public support for heliports at both grass roots and official levels, as well as the difficulty of securing suitable sites. The lack of public support is based on insufficient awareness of heliport benefits, as well as exaggerated concerns over helicopter safety and noise. Their perception that helicopters have a limited use rather than being an established public conveyance is also a factor. Public officials' support of heliport development may also be viewed as a political liability.

The matter of site selection is not simply related to noise and safety. While the land area required for a heliport may be relatively small compared to that required for an airport, heliports are needed in those locations in a community where there are competing land uses.

- (2) The cost of constructing a heliport suitable for private use is relatively small when compared to the cost of owning/operating a helicopter. Therefore, many helicopter owners have constructed their own facilities at no expense to Federal/State/local governments. This, however, does not negate the desirability of providing public-use heliports in metropolitan areas.
- (3) The lack of a system of public-use, metropolitan area heliports, is inhibiting the full potential of helicopter transportation. Airport Planning and Programming efforts are directed at informing local governments of the benefits of heliports and providing grants for their planning and construction.

5. Agency Obligations/Responsibilities to Provide for Rotorcraft—What and How to Improve Support:

- (1) To the maximum practical extent, the agency supports a broad range of efforts to optimize the unique properties and potential benefits of rotorcraft.
- (2) Data to develop improved standards for IFR heliports, including approach and departure protection, is being acquired.
- (3) Adherence to FAA standards is obligatory for Federally-aided heliport development. Additional guidance is needed to prevent the standards from being misapplied by state/local governments, with the effect of suppressing private heliport development.

N	H	C	<u>Airports Programs (ARP)</u>
	x		ARP-82-010-M Heliport Planning and Development
	x		* ARP-82-011-M Heliport System Planning
	x		* ARP-82-012-M Heliport Site Selection and Master Planning
	x		* ARP-82-013-M Heliport Development Grants
	x		ARP-82-014-M Advisory Services to Aviation and City Planners
	x		* ARP-82-015-M Liaison Support to Industry Groups Seeking Heliport Development
	x		ARP-82-016-M Sponsor Heliport Planning Seminars for Helicopter Operators and City Planners
	x		ARP-82-017-M Heliport Planning Guide
	x		ARP-82-020-M Heliport Design Guide (Advisory Circular)
			ARP-87-021-M Heliport Research and Development
x	x		ARP-83-030-M National Prototype Heliport Demonstration and Development Program
	x		ARP-86-031-M Indianapolis Downtown Heliport
	x		ARP-86-032-M New Orleans Heliport

\* = Long-term, Continuing Program/Project  
 N = National Airspace System  
 H = Heliports  
 C = Certification

AVS RESUME

ARP-82-010-M

PROJECT TITLE: HELIPORT PLANNING AND DEVELOPMENT  
PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AIRPORTS PROGRAMS

RESUME DATE: 02/17/87 LAST REVISION: 05/22/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: BOLDUC, GEORGE, APP-400, (202) 267-8786  
TEAM LEADER : BURKE, J AAS-100 (202) 267-8763  
WRITER/EDITOR :

OBJECTIVE: DEVELOP PLANNING AND DESIGN STANDARDS FOR ESTABLISHING  
HELIPORTS. ENCOURAGE COMMUNITIES TO PLAN AND CONSTRUCT CITY-CENTER  
HELIPORTS USING GRANT FUNDS AVAILABLE THROUGH THE AIRPORT IMPROVEMENT  
PROGRAM.

REQUIREMENT: MOST LARGE CITIES LACK ADEQUATE PUBLIC-USE HELIPORTS.

STATUS: GRANT FUNDS FOR HELIPORT PLANNING, DESIGN, AND DEVELOPMENT  
ARE AVAILABLE UNDER THE AIRPORT IMPROVEMENT PROGRAM.

REMARKS/NOTES: THE INITIATIVE FOR REQUESTING GRANT FUNDS FOR DEVELOPING  
PUBLIC-USE HELIPORTS MUST COME FROM THE COMMUNITIES. HELICOPTER NOISE  
MEASUREMENTS, MLS SITING REQUIREMENTS, AND TERPS PROCEDURES ARE CLOSELY  
RELATED PROGRAMS.







PROJECT TITLE: ADVISORY SERVICES TO AVIATION AND CITY PLANNERS  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AIRPORTS PROGRAMS

RESUME DATE: 02/17/87      LAST REVISION: 09/30/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: BOLDUC, GEORGE, APP-400, (202) 267-8786  
 TEAM LEADER : BURKE, J      AAS-100      (202) 267-8763  
 WRITER/EDITOR :

OBJECTIVE: SUPPORT HELIPORT DEVELOPMENT BY PROVIDING GUIDANCE TO LOCAL GOVERNMENTS, ENGINEERS, PLANNERS, AND THE PUBLIC.

REQUIREMENT: HELIPORT EXPERTISE OFTEN DOES NOT EXIST IN LOCAL GOVERNMENT--AND IS OFTEN ALSO LACKING IN THE CONSULTING FIRMS THEY EMPLOY FOR TRANSPORTATION PLANNING. SUPPORT HELIPORT PLANNING SEMINARS FOR HELICOPTER OPERATORS AND CITY PLANNERS ON A REQUEST BASIS THROUGH FAA REGIONS. PROVIDE LIAISON SUPPORT TO VARIOUS INFORMAL COMMITTEES AND TASK FORCES SEEKING LOCAL GOVERNMENT SUPPORT FOR HELIPORT DEVELOPMENT.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.    REVISED    ACTUAL		
SPONSOR HELIPORT PLANNING SEMINAR	12/31/85	12/31/88	
HELIPORT PLANNING GUIDE	12/31/85	12/31/88	

STATUS: ADVISORY SERVICES TO AVIATION AND CITY PLANNERS ARE PROVIDED ON A CONTINUING BASIS.

REMARKS/NOTES: THE MAJOR PORTION OF SERVICES ARE NOT DIRECTLY CONNECTED WITH THE AIP GRANT PROGRAM. HELIPORT INFORMATION AND GUIDANCE IS NOW BEING DEVELOPED IN THE FOLLOWING AREAS: \*

- (A) ANALYSIS OF FOUR STATE HELIPORT SYSTEM PLANS \*
- (B) ANALYSIS OF FOUR CITY/METROPOLITAN HELIPORT SYSTEM PLANS \*
- (C) DEVELOPMENT OF CASE HISTORIES OF THE HELICOPTER ACTIVITIES AND ASSOCIATED HELIPORTS IN FOUR URBAN AREAS POINTING OUT THE REASONS WHY THESE HELIPORTS EITHER SUCCEEDED OR FAILED \*
- (D) DEVELOPMENT OF METHODS, PLANNING TOOLS, QUESTIONNAIRES, AND DATA BASES TO IDENTIFY HELICOPTER NEEDS AND TO AID IN THE HELIPORT PLANNING PROCESS. \*











PROJECT TITLE: NATIONAL PROTOTYPE HELIPORT DEMONSTRATION & DEVELOPMENT  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN AIRPORTS PROGRAMS

RESUME DATE: 07/08/87 LAST REVISION: 09/30/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: BUSHEE, JIM, AAS-100 (202) 267-3446  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: SYSTEMATIC EVOLUTION OF FOUR PROTOTYPE HELIPORT FACILITIES FROM VFR ONLY CAPABILITY TO FULL IFR PRECISION APPROACH CAPABILITY BY THE 1987-88 TIMEFRAME.

REQUIREMENT: JOINT EFFORT WITH INDUSTRY TO ESTABLISH HELIPORT FACILITIES WITH FULL IFR PRECISION APPROACH CAPABILITY AND "ALL-WEATHER" HELIPORT CRITERIA AND STANDARDS BY CY-1989; FORMULATE A NATIONAL SYSTEM OF AT LEAST 25 URBAN, IFR, PUBLIC-USE HELIPORT FACILITIES BY THE YEAR 2000.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
EST. FAA/IND N. PRO. HELIPORT DEMO & DEV. PR	/	/	01/01/83
1ST NAT'L. PROTOTYPE DEMONSTRATION HELIPORT	/	/	01/01/85
1ST NAT'L. PRO. DEMO. HELIPORT W/NONPRE APPR.	/	/	01/01/87 08/01/85
1ST IFR NAT'L. PRO. DEMO. HELIPORT W/PRE APPR	01/01/83		
PUBLISH ALL-WEATHER HELIPORT DESIGN CRITERIA	01/01/88		
1ST PUB.-USE HELIPORT BUILT UNDER CRITERIA	01/01/89		
IFR HELI./TERM AREA/ROUTE STRUC. AT 5 CITIES	01/01/93		
IFR HELI./TERM AREA/RT. STRUC. AT 15 CITIES	01/01/96		
IFR HELI./TERM. AREA/RT. STRUC. AT 25 CITIES	01/01/20		

STATUS: AS PART OF THE FAA'S ROTORCRAFT MASTER PLAN, THE ALL-WEATHER HELIPORT DEVELOPMENT AND DEMONSTRATION PROGRAM WAS INITIATED IN THE FALL OF 1983. THIS EFFORT IS IN CONJUNCTION WITH INDUSTRY AND ADDRESSES THE ESTABLISHMENT OF ALL-WEATHER HELIPORT CRITERIA AND STANDARDS BETWEEN NOW\*

REMARKS/NOTES: THE FOUR LOCATIONS SELECTED WILL BE THE FIRST HELIPORT FACILITIES IN THE U.S. TO RECEIVE MICROWAVE LANDING SYSTEMS (MLS) AND AUTOMATED WEATHER OBSERVATION SYSTEMS (AWOS). EVALUATION OF NEW TECHNOLOGIES WILL BE ACCOMPLISHED AT THE NATIONAL CONCEPT DEVELOPMENT HELIPORT AT THE FAA'S TECHNICAL CENTER. AT THE CONCLUSION OF SUCCESSFUL TESTING AND CERTIFICATION, NEW SYSTEMS AND EQUIPMENT WILL BE MADE AVAILABLE FOR INSTALLATION AND OPERATIONAL USE AT THE NATIONAL PROTOTYPE DEMONSTRATION HELIPORTS. AS THE PROJECT PROGRESSES, THE FAA WILL WORK TO IMPLEMENT STEPS REQUIRED TO ESTABLISH FACILITIES WITH FULL IFR CAPABILITY. HOPEFULLY, THROUGH THIS EFFORT WE WILL SEE THE FRAMEWORK OF A NATIONAL NETWORK OF IFR HELIPORTS AND LOW-LEVEL AIRWAYS TO ACCOMMODATE THE AMERICAN ROTORCRAFT INDUSTRY BEFORE THE BEGINNING OF THE 21ST CENTURY.

\*AND CY-1989. THE FAA ANNOUNCED THE SELECTION OF FOUR COMMUNITIES TO SERVE AS CORE LOCATIONS FOR THE NATIONAL PROTOTYPE DEMONSTRATION HELIPORT PROGRAM IN OCTOBER 1983. THE CITIES ARE INDIANAPOLIS, IN; LOS ANGELES, CA; NEW ORLEANS, LA; AND NEW YORK, NY. AIP FUNDING OF APPROXIMATELY \$11 MILLION IS NEEDED. PROJECT TRANSFERRED TO ARP--PREVIOUSLY VS-220.





**POLICY AND INTERNATIONAL PROGRAMS**

## POLICY AND INTERNATIONAL SUMMARY

### 1. Major Accomplishments Include:

- (1) The FAA has actively supported rotorcraft noise reduction programs since 1973, including a wide-ranging industry/Government noise measurement and evaluation program. In 1981, it was decided that program should be accelerated and that a substantial NASA/Army/FAA/industry noise research program should be initiated. That program is being coordinated from the NASA Langley Research Center and involves a total resource commitment from all the parties involved in excess of \$20 million over 5 years.
- (2) Since 1975, the FAA has measured the noise from domestic and foreign manufactured helicopters in support of ICAO rulemaking on noise standards. The data have been used both by FAA and industry to form the basis for the U.S. position for helicopter rulemaking activity. Some of the most recent Noise Measurement Reports are:

#### Noise Measurement Flight Test: Data/Analyses

- o Bell 222 Twin Jet (Report No. FAA-EE-84-1)
  - o Aerospatiale SA 365N Dauphin 2 (Report No. FAA-EE-84-2)
  - o Hughes 500 D/E (Report No. FAA-EE-84-3)
  - o Aerospatiale AS 355F Twin Star (Report No. FAA-EE-84-4)
  - o Aerospatiale AS 350D AStar (Report No. FAA-EE-84-5)
  - o Sikorsky S-76A (Report No. FAA-EE-84-6)
  - o Boeing Vertol 234/CH-47D (Report No. FAA-EE-84-7)
  - o ICAO Helicopter Noise Measurement Repeatability Program vs. Test Report (Report No. FAA-EE-85-6)
- (3) The FAA has participated in an international forum of evaluating ICAO standardized noise testing for helicopters.
  - (4) The FAA has also worked with manufacturers in developing noise abatement procedures.
  - (5) Helicopter noise levels were measured at several cities in the contiguous U.S. to obtain background information of noise levels associated with helicopter operations in the urban environment. Those reports currently available are:
    - o Helicopter Noise Exposure Curves for use in Environmental Impact Assessment (November 1982)—Report No. FAA-EE-82-16
    - o A Survey of Helicopter and Ambient Urban Noise Levels in Phoenix, Arizona (December 1982)—Report No. FAA-EE-82-20
    - o Helicopter Noise Survey at Selected New York City Heliports (March 1983)—Report No. FAA-EE-83-2

- o Helicopter Noise Survey Performed at Parker Center, Pasadena and Anaheim, California (February 10-14, 1983)—Report No. FAA-EE-83-5
  - o Helicopter Noise Survey Conducted at Norwood, Massachusetts (April 27, 1983)—Report No. FAA-EE-83-6
  - o Helicopter Noise Survey Performed at Las Vegas, Nevada (January 19-21, 1984)—Report No. FAA-EE-84-15
  - o Helicopter Noise Survey for Selected Cities in the Contiguous United States (March 20, 1985)—Report No. FAA-EE-85-3.
- (6) Advisory Circular (AC 150-5020-2) on how to assess noise impacts for new heliports was issued.
- (7) A Heliport Community Response Study was completed that details reactions of individuals with respect to various modes of helicopter operations. The study is titled A Community Survey of Helicopter Noise Annoyance Conducted Under Controlled Noise Exposure Conditions.
- (8) Technical and financial support were provided to NASA Langley on helicopter aeroacoustics.
- (9) The FAA conducted its Eleventh Annual FAA Forecast Conference in February 1987.

## 2. Current Projects Include:

- (1) Measure and analyze heliport noise levels at a variety of urban and suburban heliports (see Resume API-82-012-M).
- (2) Estimate, from industry growth trends and from noise measurements, present and future noise impacts (see Resume API-82-020-M).
- (3) Develop appropriate heliport planning and siting evaluation for noise, including the development and validation of computerized noise contour methodology (See Resumes API-82-013-M, API-82-022-M, API-82-023-M, and API-82-024-M).
- (4) Development of software to evaluate compatible land use for public-use heliports (See Resume API-84-025-M).

## 3. Problems/Needs and Actions Being Taken:

The greatest needs of the rotorcraft industry in the area of noise are the development of an economically sensible noise abatement technology and the development and validation of a workable noise prediction methodology.

An additional need is for the FAA (working with the operators and local officials) to develop practical noise abatement operational procedures and routes for urban areas. This process is time-consuming and has been largely

handled on a case-by-case basis as the demands arise. The agency should supplement this type of action by working out generalized noise abatement advisory circulars and other guidance materials, as was done a decade ago for fixed-wing aircraft. This would also include heliport planning data and guidelines.

Also, to prepare meaningful plans and to establish priorities for rotorcraft programs, the FAA Office of Aviation Policy and Plans is preparing helicopter activity forecasts.

4. Agency Obligations/Responsibilities to Provide For Rotorcraft—What and How to Improve Support:

The FAA is obligated to develop and implement reasonable and practical regulations to promote the safe and orderly expansion of civil aviation. The agency is also responsible for providing technical assistance, guidance, and support. This can best be accomplished by close cooperative effort with all of the elements involved.

N	H	C	<u>Policy and International Programs (API)</u>	
	x	x	API-82-010-M	Helicopter Noise Development Program
	x		API-82-012-M	Urban Heliport Noise Measurement
	x		API-82-013-M	Heliport Site Assessment Methodology
	x	x	API-82-017-M	Part 36 Noise Certification Standard
	x	x	API-82-020-M	Community Noise Compatibility Planning Program
	x	x	API-82-022-M	FAR Part 150 Revision
	x	x	API-82-023-M	Computer Data Base Enhancement
	x	x	API-82-024-M	Heliport Noise Model For Microcomputers
	x		API-82-025-M	Evaluation of Compatible Land Use for Public-Use Heliports
x	x	x	API-83-030-M	Forecast Conference—Helicopter Fleet Outlook
x	x	x	API-83-060-M	Economic Analysis of Helicopter Operations

N = National Airspace System  
 H = Heliports  
 C = Certification



AVS RESUME

API-82-012-N

PROJECT TITLE: URBAN HELIPORT NOISE MEASUREMENT  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN POLICY AND INTERNATIONAL PROGRAMS

RESUME DATE: 03/05/87 LAST REVISION: 09/11/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: ALBERSHEIM, STEVE, AEF-110 (202) 267-3500  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: TO QUANTIFY HELICOPTER NOISE IMPACTS AROUND A VARIETY OF URBAN HELIPORTS.

REQUIREMENT: MEASURE THE EXTENT OF NOISE IMPACTS AROUND HELIPORTS AND DETERMINE THE PRACTICALITY OF MAKING SIGNIFICANT NOISE REDUCTION THROUGH CHANGES IN OPERATIONAL PROCEDURES.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
FINAL REPORT OF INITIAL SURVEYS	/	/	03/31/85
DRAFT REPORT OF ANALYSIS OF SURVEYS	/	/	02/28/85
INITIATE ADDITIONAL FIELD SURVEYS	02/28/86		
FINAL REPORT	07/31/86		

STATUS: ADDITIONAL FUNDING HAS NOT BEEN APPROVED. THIS RESUME IS CONTINUED IN THIS EDITION FOR ACCOUNTABILITY ONLY. IT WILL BE DELETED IN THE NEXT EDITION.

PROJECT TITLE: HELIPORT SITE ASSESSMENT METHODOLOGY  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN POLICY AND INTERNATIONAL PROGRAMS

RESUME DATE: 03/05/87      LAST REVISION: 09/11/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: TEDRICK, DICK, AEE-3 (202) 267-3577      \*  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: DEVELOP SENSIBLE ENVIRONMENTAL CRITERIA FOR SITING NEW OR EXPANDED-USE HELIPORTS IN URBAN AREAS.

REQUIREMENT: THE FAA NEEDS TO PROTECT THE LEGITIMATE ENVIRONMENTAL AND ECONOMIC NEEDS OF BOTH THE PUBLIC AND INDUSTRY BY SETTING UNIFORM NATIONAL STANDARDS.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.      REVISED      ACTUAL		
INTERIM CRITERIA PUBLISHED (FAA/HAI)	/	/	12/31/83
ADVISORY CIRCULAR (AC-150/5020-2) PUBLISHED	/	/	12/31/83
REVISE ADVISORY CIRCULAR	08/31/85	02/28/86	

STATUS: PROJECT IS ON HOLD.

REMARKS/NOTES: INTERFACES HAVE INCLUDED THE HAI, AMERICAN PLANNING ASSOCIATION, AND THE NATIONAL LEAGUE OF CITIES AND COUNTIES. ADVISORY CIRCULAR 150/5020-2, NOISE ASSESSMENT GUIDELINES FOR NEW HELIPORTS, WAS PUBLISHED DECEMBER 9, 1983. REVISION OF THE CURRENT ADVISORY CIRCULAR TO EXPAND THE DATA BASE AND TO HELP CLARIFY THE METHODOLOGY SET FORTH IN THE AC -150-5020-2 SO IT IS MORE EASILY UNDERSTOOD.





PROJECT TITLE: FAR PART 150 REVISION  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN POLICY AND INTERNATIONAL PROGRAMS

RESUME DATE: 03/12/87 LAST REVISION: 09/11/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: HIXSON, ROBERT, AEE-110 (202) 267-3565  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: TO REVISE FEDERAL AVIATION REGULATIONS (FAR) PART 150 TO INCLUDE HELIPORTS AND HELIPADS.

REQUIREMENT: AT THE PRESENT TIME, HELIPORTS/HELIPADS ARE NOT INCLUDED IN FAR PART 150 ANALYSES.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.	REVISED	ACTUAL
ISSUE NOISE ABATEMENT ADVISORY CIRCULAR	/ /		10/31/83
INITIATE PART 150 REVISION	/ /		05/31/84
ISSUE NPRM	06/30/85		11/04/86
ISSUE RULE	06/30/86	03/31/88	

STATUS: A DRAFT FINAL RULE IS IN PROCESS.

REMARKS/NOTES: FAR PART 150 CONTAINS THE REQUIREMENTS FOR PREPARING NOISE EXPOSURE MAPS AND NOISE COMPATIBILITY PROGRAMS. BY LAW, SUCH MAPS AND PROGRAMS ARE PREREQUISITES FOR FUNDING OF NOISE CONTROL PROJECTS OUT OF TRUST FUND MONIES. AS APPROPRIATE, NOISE METRICS AND SITING CRITERIA ARE DEVELOPED FOR HELICOPTERS AND HELIPORTS--REQUIREMENTS CAN BE DEVELOPED FOR NOISE CONTROL AROUND HELIPORTS AND HELIPADS. THESE REQUIREMENTS MAY BE INCLUDED IN FAR PART 150 SOMETIME AFTER 1988.



AVS RESUME

API-82-024-M

PROJECT TITLE: HELIPORT NOISE MODEL FOR MICROCOMPUTERS  
PROJECT CATEGORY: ROTORCRAFT MASTER PLAN POLICY AND INTERNATIONAL PROGRAMS

RESUME DATE: 03/12/87 LAST REVISION: 07/06/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: CONNOR, THOMAS, AEE-120, (202) 267-3570  
TEAM LEADER :  
WRITER/EDITOR :

OBJECTIVE: DEVELOPMENT OF A COMPUTER MODEL TO BE USED WITH A MICROCOMPUTER FOR SPECIFIC EVALUATION OF HELISTOPS/HELIPORTS.

REQUIREMENT: AS THE USE OF HELICOPTERS BECOMES MORE WIDESPREAD IN THE URBAN AREA, PLANNERS WILL NEED A TOOL TO ASSESS THE NOISE IMPACT FROM THESE OPERATIONS. THE DEVELOPMENT OF A DESK-TOP COMPUTER MODEL WILL ENABLE THE PUBLIC AND INDUSTRY TO BETTER EVALUATE THE IMPACTS AND ECONOMIC CONSIDERATION.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
PROTOTYPE MODEL	06/30/84		04/10/87*
FINAL MODEL	03/31/85	11/15/87	*

STATUS: CONTRACT AWARDED SEPTEMBER 1985 TO PROCEED WITH DEVELOPMENT OF THE MODEL.

REMARKS/NOTES: THIS WILL ALLOW NOISE ASSESSMENT AT HELIPORTS/HELISTOPS IN A LESS COSTLY AND COMPLEX PROGRAM THAN THE INM WHICH ONLY ADDRESSES THE MIX OF HELICOPTERS AND AIRPLANES AT AIRPORTS. MILESTONE SLIPPAGE IS DUE TO OTHER AGENCY BUDGET PRIORITIES.



AVS RESUME

API-83-030-M

PROJECT TITLE: TWELFTH ANNUAL FAA AVIATION FORECAST CONFERENCE \*  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN POLICY AND INTERNATIONAL PROGRAMS

RESUME DATE: 07/06/87 LAST REVISION: 07/08/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: MERCER, GENE, APO-110 (202) 267-3355  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: TO PROVIDE AN INDUSTRY FORUM FOR REVIEWING FUTURE  
 DIRECTION IN AVIATION GROWTH.

REQUIREMENT: NEED FOR IMPROVING HELICOPTER FORECASTING CAPACITY.

MILESTONE SCHEDULE	COMPLETION DATES:	SCHED.	REVISED	ACTUAL
SESSION ORGANIZATION		/ /		10/30/86*
CONFERENCE		/ /		02/20/87*
DOCUMENT		03/31/86		02/28/87*

STATUS: THE DOCUMENT DESCRIBING THE TWELFTH ANNUAL FORECAST \*  
 CONFERENCE WAS DISTRIBUTED ON SCHEDULE. THIS CONFERENCE IS HELD ON A  
 YEARLY BASIS. THIS IS A CONTINUING PROGRAM.

REMARKS/NOTES: COMPLETED FOR 1987.



**DEVELOPMENT AND LOGISTICS PROGRAMS**

## Development and Logistics Summary

### 1. Major Accomplishments Include:

- (1) Awarded a contract (5-year period of performance with a \$5 million ceiling) for support of the Helicopter Program over the full range of the Development and Logistics (ADL) portion of the Rotorcraft Master Plan.
- (2) Rotorcraft Flight Operations and Procedures Support (Resume ADL-82-010-M)
  - Completed data collection to determine optimum MLS sensitivity for collocated MLS operations. Completed collocated MLS TERPS data collection for basic (straight-in, 60 knots constant speed to DH, single pilot, raw data) heliport approaches and departures.
  - Awarded a contract to upgrade the FAA S-76 helicopter to reflect the capabilities of newer aircraft in the fleet.
  - Completed a cooperative project with NASA assessing the feasibility of simulator use to establish part of the data base required to support TERPS development.
  - Completed data collection for "shuttle holding pattern" TERPS using MLS for azimuthal guidance.
  - Completed the collection of additional TERPS data for MLS approaches to heliports at higher angles and Vmini approach.
  - Completed the definition of MLS critical areas for facilities installed at heliports.
  - Completed data reduction and integration procedures for performing joint fixed-wing/rotary-wing flight inspection in preparation for the commissioning flight inspection of a heliport MLS.
- (3) Rotorcraft ATC (Resume ADL-82-020-M)
  - Developed basic ATC training materials on helicopters and helicopter operations.
  - Initiated a project to collect and analyze helicopter wake vortex and downwash data for use in the revision of ATC separation standards (helicopter/helicopter and helicopter/airplane).
  - Completed a project in support of air traffic planning for the implementation of MLS in terminal areas.
  - Completed phase 1 of a cost/benefit analysis of alternatives

for providing improvements to low altitude navigation, communication, and surveillance services.

(4) Rotorcraft Weather (Resume ADL-82-030-M)

- Completed a study of weather deterioration patterns and analysis of current weather-related rules for instrument operations.
- Deployed automated weather observing system (AWOS) demonstrators at Indianapolis and FAA Technical Center heliports to study heliport AWOS siting criteria and operational suitability.
- Completed a study to define siting standards for installation of AWOS at heliports.
- Completed a demonstration of the operational suitability of the AWOS at heliports.
- Published an advisory circular defining a method of obtaining FAA design certification of a non-federal AWOS and certified the first such system using this method.
- Initiated a cooperative effort with National Weather Service to develop short-term aviation weather forecasting algorithms for future use with AWOS. Completed algorithm development and started validation.

(5) Rotorcraft Communications (Resume ADL-82-040-M)

- Developed and deployed systems to improve low-altitude/remote-area communications for helicopter users in selected geographic areas.
- Completed efforts to provide guidance to users and FAA facility planners to improve low-altitude VHF communications service.

(6) Rotorcraft TCAS (Resume ADL-82-050-M)

- Completed effort to define helicopter user needs and preferences related to TCAS use.
- Evaluated the suitability of TCAS for use in helicopter operations and developed modified design/performance standards for helicopter TCAS.
- Completed TCAS surveillance studies in Bell 206 and Sikorsky S-76 helicopters.

(7) Rotorcraft Low-Altitude Surveillance (Resume ADL-82-060-M)

- Developed operational interfaces for receiving, processing, and displaying automatic dependent surveillance data on the ATC displays in the Houston Center.

- Initiated an evaluation of the accuracy of LORAN flight following (LOFF) in comparison with en route radar.
- (8) Rotorcraft Navigation/Landing (Resume ADL-82-070-M)
- Supported the certification of LORAN-C for en route use by helicopters and the associated reduction of offshore route widths from 100 nm to 8 nm.
  - Supported development and certification of airborne radar approaches (ARA) for rotorcraft nonprecision approaches based on airborne weather radar in the ground mapping mode.
  - Completed a study to define siting standards for installation of microwave landing system (MLS) at heliports.
  - Completed an evaluation of LORAN-C WNAV use in a helicopter in support of the development of new, minimum operational performance standards (MOPS).
  - Collected GPS data in the Hudson/East River areas of New York City at low altitudes for the evaluation of signal integrity and the effects of different satellite positions on signal accuracy.
  - Developed a prototype MLS RNAV and used it to develop helicopter applications of this technology. This effort has supported efforts to develop minimum operational performance standards (MOPS) for MLS RNAV.
  - Completed 1-year data collection of LORAN-C stability in the Gulf of Mexico and flight data collection of pilotage error information to support certification of LORAN-C for nonprecision approaches.
- (9) Heliport Planning and Design Criteria (Resume ADL-82-080-M)
- Completed construction of a National Concept Development Heliport at the FAA technical Center. Installed at this IFR heliport are MLS, AWOS, and IFR heliport lighting.
  - Completed a cooperative program with DOD for the development of a standard helipad lighting system.
  - Completed simulation testing of proposed heliport approach light system configurations.
  - Completed a joint project with the FAA Eastern Region to demonstrate use of MLS at Battery Park Heliport in New York City.

- Initiated an effort to validate the obstruction clearance surfaces (approach and departure) in the FAA advisory circular on heliport design.
- Initiated an effort to validate the minimum dimensions required for helicopter parking areas and taxiways in the FAA advisory circular on heliport design.

(10) Rotorcraft Airworthiness and Flying Qualities (Resume ADL-82-090-M)

- Completed a study of missed approach performance supporting the S-76 certification at an airspeed ( $V_{\text{mini}}$ ) of 40 knots.
- Completed an operational survey and accident analysis to identify the hazards of rotorcraft operations and the root causes of rotorcraft accidents.
- Established agreements with NAE (Canada) for handling qualities.
- Completed a preliminary investigation at NAE (Canada) of handling qualities requirements for rotorcraft instrumentation flight during decelerating approach maneuvers and overshoot.
- Completed a study to determine the effects of flight directors and control system augmentation on pilot workload during steep decelerating rotorcraft approaches in IMC.

(11) Rotorcraft Icing (Resume ADL-82-100-M)

- Supported icing certification activities in the Rotorcraft Certification Directorate (AC 29-2).
- Developed the definition of the icing environment in supercooled clouds below 10,000 feet.
- Established an interagency agreement with NASA to develop simulation tools.
- Published a technical report on improvements in ground deicing technology and procedures.

(12) Rotorcraft Crashworthiness/Structural Airworthiness (Resume ADL-82-110-M)

- Established a joint effort with DOD and developed several crashworthy cabin concepts using composites.

- Completed work to define the rotorcraft crash environment and review existing crashworthiness technology.
- Completed the development of an advisory circular for occupant restraint.

(13) Rotorcraft Obstruction Avoidance (Resume ADL-83-120-M)

- Initiated preparation of a program plan for systematic study of alternatives for preventing rotorcraft collisions with obstacles.

(14) Rotorcraft Atmospheric Electrical Hazards (Resume ADL-85-130-M)

- Published a handbook addressing aircraft lightning protection.
- Developed material which was used as a basis for guidelines for the certification of digital systems and produced a digital systems handbook.
- Published a draft geographic study of lightning strike data.
- Published a report covering the 1987 Direct Strike Lightning data gathering effort.

(15) Rotorcraft Human Behavior (Resume ADL-85-150-M)

- Developed a training manual on aeronautical decisionmaking for helicopter pilots. Voluntary use of this manual is expected to help reduce the number of pilot error accidents.

2. Future Plans Include:

(1) Rotorcraft Flight Operations and Procedures Support (Resume ADL-82-010-M)

- Collect TERPS data to support the full use of MLS, LORAN-C, Global Positioning System, and other NAVAIDS.
- Collect TERPS data for flight director, coupled, and decelerating steep approaches and complex MLS/RNAV procedures.
- Quantify, via simulation and flight testing, the extent to which MLS (collocated) TERPS constraints can be decreased in the visual segment of a precision approach to a heliport.
- Develop the capability to generate portions of the data base required for TERPS development using simulators.

- Develop criteria and mechanism to handle newer generation rotorcraft and their capabilities for low-speed IFR operations.

(2) Rotorcraft ATC (Resume ADL-82-020-M)

- Develop tools and methodologies (e.g., simulation) for the preparation of specific ATC procedures for rotorcraft.
- Initiate an effort to review and modify the Northeast Corridor helicopter routes and to develop recommendations for national standards for low-altitude helicopter routes.
- Collect and analyze data on helicopter wake vortex/downwash effects and recommend appropriate ATC separation standards.
- Establish plan and justification for low-altitude communications/navigation/surveillance service improvements based on cost/benefit analysis. Address needs of air ambulance helicopter operations in particular.

(3) Rotorcraft Weather (Resume ADL-82-030-M)

- Define requirements for low-altitude, short-term forecasts (including icing) better suited for rotorcraft operations.
- Continue to support projects to enhance the quality and availability of weather information for rotorcraft operations in joint efforts with the National Weather Service and other agencies.

(4) Rotorcraft Communications (Resume ADL-82-040-M)

- Define implementation options and provide for future improvement of low-altitude communications service.

(5) Rotorcraft Traffic-Alert Collision Avoidance System (TCAS) (Resume ADL-82-050-M)

- Complete final documentation of TCAS evaluation on the S-76.

(6) Rotorcraft Low-Altitude Surveillance (Resume ADL-82-060-M)

- Develop the means to augment low-altitude surveillance coverage.
- Develop full, low-altitude aircraft tracking capability, including related procedures and sufficient level of automation to support direct, random routing for rotorcraft.

- Define implementation options and provide for future improvement of low-altitude surveillance service.
- (7) Rotorcraft Navigation/Landing (Resume ADL-82-070-M)
- Continue to develop new capabilities involving rotorcraft navigation in the en route and terminal environments.
  - Define implementation options and provide for future improvement of low-altitude navigation service.
- (8) Heliport Planning and Design Criteria (Resume ADL-82-080-M)
- Rigorously validate the obstruction clearance surfaces in the FAA advisory circular on heliport design.
  - Rigorously validate the minimum dimensions required for helicopter parking areas and taxiways in the FAA advisory circular on heliport design.
  - Evaluate all technical elements associated with IFR heliports and develop recommendations on heliport design standards.
  - Develop recommendations for national guidelines on heliport planning.
  - Validate helicopter IFR approach lighting simulation test results by conducting actual weather IFR/MLS approaches to the Concept Development Heliport at the FAA Technical Center.
- (9) Rotorcraft Airworthiness and Flying Qualities (Resume ADL-82-090-M)
- Define the minimum equipment required for steep decelerating rotorcraft approaches in IMC.
  - Evaluate advanced flight control systems/technology (fly-by-wire) to establish standards which can be used during the certification process.
  - Evaluate electronic display systems (CRT) for certification/compliance issues related to display clutter, format, location, and configuration.
  - Evaluate various low-visibility aids such as forward looking infrared (FLIR) and low-level video for use during landings in IMC.

- Develop a data base establishing criteria and standards for advanced control/display systems for near zero/zero visibility landing conditions at heliports.
- Continue to provide expertise and methods to tap extensive research and development community resources and ability to capitalize on related activities.

(10) Rotorcraft Icing (Resume ADL-82-100-M)

- Develop improved definitions of low-altitude atmospheric environment under various meteorological conditions which include snow, freezing rain, and mixed conditions for the establishment of realistic icing certification requirements.
- Provide the infrastructure for efficient icing simulation and test procedures to support certification activities.
- Develop improved techniques and procedures (analysis and simulation) which can be used during the certification process.
- Provide icing instrumentation calibration standards.

(11) Rotorcraft Crashworthiness/Structural Airworthiness (Resumes ADL-82-110-M)

- Evaluate advanced technology design techniques and materials (composite) to establish a data base which can be used by the airworthiness specialist during the certification process.
- Evaluate damage tolerant structures and designs to establish specifications and standards.
- Develop analytical/model testing techniques which can be used during the certification process.

(12) Rotorcraft Obstruction Avoidance (Resume ADL-83-120-M)

- Initiate studies on rotorcraft obstruction collisions as related to crashworthiness issues on crash dynamics, seat/stretcher restraint systems, occupant evacuation, and escape procedures.
- Evaluate alternatives for improving low-altitude flight safety including new operational procedures, additional avionics, crashworthiness, and crew training.
- Develop new techniques to mark, light, detect, and protect against collision with obstructions.

- Determine the best mix of measures to achieve an overall level of desired safety, at lowest cost, for low-level, visual operations such as air ambulance rotorcraft missions.

(13) Rotorcraft Atmospheric Electrical Hazards (Resume ADL-85-130-M)

- Use data obtained from the airborne direct strike lightning strike program to develop the lightning hazard model.
- Establish the lightning strike zones for various configurations of rotorcraft.
- Establish protection criteria for flight critical/essential electronic flight control systems which will include software reliability assessment.

(14) Simulator Validation (Resume ADL-85-140-M)

- Develop the necessary criteria and guidance material to permit FAA certification of helicopter simulators to enhance helicopter pilot training and certification.

(15) Rotorcraft Human Behavior (Resume ADL-85-150-M)

- Develop a training manual on aeronautical decisionmaking specifically directed toward air ambulance pilots, operators, and hospital administrators.
- Evaluate human factors issues related to the use of advanced rotorcraft displays and associated controls for use in decelerating approaches to heliports.
- Establish the relationship between fatigue, stress, rotorcraft cockpit design and crew-duty times.

4. Agency Obligations/Responsibilities to Provide for Rotorcraft--What and How to Improve Support

- (1) Define rotorcraft needs and problems through dialogue with agency operating services, industry, and the public, and to enhance agency responsiveness to defined requirements.
- (2) Establish ADL programs which result in rotorcraft-related improvements for industry and the public. Strong emphasis will continue to be placed on safety and efficiency improvements, however, continued emphasis will be placed on the agency's role of fostering aviation.

- (3) Capitalize on the unique relationships between ADL and other elements of technical community to form synergisms.
- (4) Develop systems for the implementation of safety and service improvements to enhance the integration of rotorcraft into the NAS. The goal is to permit rotorcraft to operate safely and efficiently under all conditions in which the fixed-wing industry will operate.

N	H	C	<u>Development and Logistic Programs (ADL)</u>
x	x		ADL-82-010-M Rotorcraft Flight Operations and Procedures Support
x	x		ADL-82-020-M Rotorcraft ATC
x	x		ADL-82-030-M Rotorcraft Weather
x	x		ADL-82-040-M Rotorcraft Communications
x		x	ADL-82-050-M Rotorcraft Traffic-Alert Collision Avoidance System
x			ADL-82-060-M Rotorcraft Low-Altitude Surveillance
x		x	ADL-82-070-M Rotorcraft Navigation/Landing
x	x		ADL-82-080-M Heliport Planning and Design Criteria
		x	ADL-82-090-M Rotorcraft Airworthiness and Flying Qualities
		x	ADL-82-100-M Rotorcraft Icing
		x	ADL-82-110-M Rotorcraft Crashworthiness/Structural Airworthiness
x	x	x	ADL-83-120-M Rotorcraft Obstruction Avoidance
		x	ADL-85-130-M Rotorcraft Atmospheric Electrical Hazards
		x	ADL-85-140-M Simulator Validation
		x	ADL-85-150-M Rotorcraft Human Behavior

N = National Airspace System  
 H = Heliports  
 C = Certification

PROJECT TITLE: ROTORCRAFT FLIGHT OPERATIONS AND PROCEDURES SUPPORT  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/19/87 LAST REVISION: 09/10/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: BILLMAN, BARRY ACT-140, (609) 484-6608  
 TEAM LEADER : SMITH, R APM-450 (202) 267-3783  
 WRITER/EDITOR :

OBJECTIVE: TO PROVIDE DATA BASE FOR REVISION OF CHAPTER 11 OF THE TERMINAL INSTRUMENT PROCEDURES MANUAL. INVOLVES REPRESENTATIVE HELICOPTERS/ VARIOUS SYSTEMS AT FAA TECHNICAL CENTER, USE SUBJECT PILOTS ON INSTRUMENTED RANGE, AND COMPILE DATA AND RESULTS FOR HANDOFF TO THE OFFICE OF FLIGHT STANDARDS AND THE AVIATION STANDARDS NATIONAL FIELD OFFICE. ALSO, INCLUDES LONGER TERM OBJECTIVES TO USE SIMULATOR DATA FOR TERPS DEVELOPMENT AND PROVIDE A PORTABLE SYSTEM TO PERMIT HELIPORT FLIGHT INSPECTION AND COLLECTION OF TERPS DATA FROM PRIVATE SECTOR ROTORCRAFT.

REQUIREMENT: INDUSTRY EXPRESSED NEED TO REVISE TERPS AND ESTABLISH DATA USING NAV/LANDING SYSTEMS AND NEWER ROTORCRAFT, WHICH WILL OPERATE AT LOWER SPEEDS, STEEPER DESCENTS, ETC. A CONTINUOUS INTRODUCTION OF NEW SYSTEMS AND ROTORCRAFT WILL REQUIRE THE AGENCY TO ADDRESS THE NEED FOR REVISED TERPS AND CRITERIA TO GRANT PRIVILEGES COMMENSURATE WITH CAPABILITY.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
MLS BASIC TERPS DATA COLLECTION COMPLETE	/	/	12/31/84
PREL. LORAN C TERPS DATA COLLECTION COMPLETE	/	/	12/31/84
ADVANCED TERPS DATA COLLECTION START	01/31/85	01/31/86	08/31/86
MLS FLIGHT INSPECTION (PHASE I) COMPLETE	03/31/86		10/30/86*
HOLDING PATTERN TERPS DATA COLLECTION	01/31/86		10/30/86*
DECELERATING TERPS (PHASE I) DATA COLLECTION	06/30/86	10/30/87	

STATUS: THE FAA HAS AWARDED A CONTRACT TO UPGRADE THE AGENCY'S S-76 HELICOPTER TO REFLECT THE CAPABILITIES OF NEWER AIRCRAFT IN THE FLEET. THE FAA HAS DECIDED NOT TO PURSUE WORK ON 2-CUE AND 3-CUE FLIGHT DIRECTORS.

REMARKS/NOTES: ADVANCED TERPS INCLUDE MLS RNAV, FLIGHT DIRECTOR, COUPLED APPROACH, AND DECELERATING APPROACH DATA COLLECTION. MLS REQUIRED FOR FAA TECHNICAL CENTER HELIPORT. THIS EFFORT RESPONDS TO REQUIREMENTS IDENTIFIED IN RESUMES UNDER AVS-82-020-M.

PROJECT TITLE: ROTORCRAFT ATC  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/18/87      LAST REVISION: 09/10/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: HWOSCHINSKY, PETER, APM-450, (202)267-8531  
 TEAM LEADER : WEISS, R      APM-450      (202)267-8535 \*  
 WRITER/EDITOR :

OBJECTIVE: TO PROVIDE TECHNICAL METHODOLOGIES, TOOLS, AND DATA BASE TO SUPPORT IMPROVEMENTS TO THE ATC SYSTEM FOR FULLER INTEGRATION OF ROTORCRAFT INTO THE NAS. THIS INCLUDES WORK WITH ATC SIMULATION, SPECIAL ROUTES, AND IMPROVED ATC SEPARATION STANDARDS BASED ON WAKE VORTEX AND DOWNWASH. ALSO INCLUDES A COST/BENEFITS ANALYSIS TO DETERMINE THE EXTENT AND BEST METHODS TO IMPROVE LOW ALTITUDE COMMUNICATION, NAVIGATION, AND SURVEILLANCE ATC SERVICES.

REQUIREMENT: METHODOLOGIES, TOOLS, TECHNIQUES, AND DATA BASE NEEDED TO DEVELOP EFFICIENT PROCEDURES AND CRITERIA FOR ATC OF HELICOPTERS. IN CASES WHERE AN ATTEMPT IS MADE TO INTEGRATE HELICOPTERS INTO THE NAS, FAA PROVISIONS ARE CURRENTLY MADE ON A FRAGMENTED, CASE-BY-CASE BASIS, WITH LIMITED METHODOLOGIES, TOOLS, AND DATA.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.      REVISED      ACTUAL		
ATC MLS TERMINAL AREA STUDIES START	/	/	08/31/84*
ATC MLS TERMINAL AREA STUDIES COMPLETED	12/31/86		12/31/85*
SPECIAL ROUTES STUDY START	12/31/83	12/31/87	
SPECIAL ROUTES STUDY COMPLETED	06/30/86	06/30/89	
PREL. WAKE/VORTEX/DOWNWASH TESTS START	/	/	03/31/84
PREL. WAKE/VORTEX/DOWNWASH TESTS COMPLETED	12/31/85	08/31/86	01/15/87
PHASE II WAKE VORTEX/DOWNWASH TESTS START	08/30/87		09/09/87*
PHASE II WAKE VORTEX/DOWNWASH TESTS COMPLETED	12/31/88		
LOW ALT. COST/BENEFIT ANALYSIS PHASE I START	/	/	08/31/83*
LOW ALT. COST/BENEFIT ANALYSIS PHASE I COMPL.	11/30/84	08/31/86	08/31/86*
LOW ALT. COST/BENEFIT ANALYSIS PHASE II START	10/30/87		*
LOW ALT. COST/BENEFIT ANALYSIS PHASE II COMPL	03/30/90		*

STATUS: THE FAA HAS DECIDED NOT TO PURSUE THE LOW-ALTITUDE POSITIVE CONTROL STUDY.

REMARKS/NOTES: THIS EFFORT SUPPORTS ACTIVITIES IDENTIFIED IN RESUMES ATO-82-011-M, ATO-82-012-M, ATO-82-013-M, ATO-82-014-M, AND ATO-82-016-M. WAKE VORTEX/DOWNWASH TEST EFFORT: AES-310 AND ACT-330.

PROJECT TITLE: ROTORCRAFT WEATHER  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/18/87 LAST REVISION: 09/10/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: IMBEMBO, STEPHEN, APM-650 (202) 267-8663  
 TEAM LEADER : SMITH, R APM-450 (202) 267-3783  
 WRITER/EDITOR :

OBJECTIVE: TO PROVIDE FOR AVAILABILITY OF APPROPRIATE METEOROLOGICAL INFORMATION FOR ROTORCRAFT OPERATIONS. INCLUDES ALL ACTIVITIES RELATED TO MAKING WEATHER INFORMATION MORE READILY AVAILABLE. DEVELOP SMALL, LOW-COST WEATHER OBSERVATION SYSTEM DESIGNS AND REQUIREMENTS FOR SHORTER TERM FORECASTS FOR ROTORCRAFT OPERATIONS ALSO PROVIDES IMPROVED DEFINITION OF HELICOPTER OPERATIONAL REQUIREMENTS FOR WEATHER INFORMATION.

REQUIREMENT: SMALL, LOW-COST WEATHER OBSERVATION SYSTEMS FOR HELIPORTS, SHORTER TERM FORECASTS MORE SUITED TO SHORTER MISSIONS, LOW ALTITUDES/REMOTE AREA OBSERVATIONS/FORECASTS, INCLUDING ICING. CURRENT OBSERVATIONS AND FORECASTS ARE FREQUENTLY NOT AVAILABLE IN MANY AREAS WHERE ROTORCRAFT OPERATE. SACRIFICES IN EFFICIENCY ARE OFTEN DIRECTLY ATTRIBUTABLE TO CONSTRAINTS INTRODUCED BY LIMITED AVAILABILITY OF FORECASTS OR OBSERVATIONS.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
AWOS DEMO. UNIT INSTALLED-HOUMA, LA AIRPORT	/	/	08/31/85
AWOS DEMO. UNIT INSTALLED-FAA TECH CENTER	/	/	05/31/83*
AWOS DEMO. UNIT INSTALLED-INDIANAPOLIS, IN	/	/	12/31/85*
WEATHER OBSERVATION SYSTEM DESIGN COMPLETED	06/30/87	12/31/86	04/11/86
SHORT-TERM FORECASTING STUDY START-PHASE I	/	/	09/30/83
SHORT-TERM FORECASTING STUDY COMP.-PHASE I	/	/	12/31/85
NON-FEDERAL AWOS ADVISORY CIRCULAR PUBLISHED	/	/	04/11/86
FIRST NON-FEDERAL AWOS CERTIFIED	/	/	12/30/86

STATUS: DEMONSTRATION UNITS INSTALLED AT THE INDIANAPOLIS, IN, HELIPORT, AND THE FAA TECHNICAL CENTER HELIPORT. THE NATIONAL WEATHER SERVICE HAS ASSUMED THE RESPONSIBILITY FOR DEPLOYMENT OF AWOS. \*

REMARKS/NOTES: THIS EFFORT SUPPORTS ACTIVITIES IDENTIFIED IN ATO-82-015-M. FAA AWOS DEPLOYMENT HAS BEEN DELAYED DUE TO CONSTRUCTIONAL PROBLEMS.

AVS RESUME

ADL-82-040-M

PROJECT TITLE: ROTORCRAFT COMMUNICATIONS  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/18/87 LAST REVISION: 09/10/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: SMITH, ROBERT, APM-450, (202)267-3783  
 TEAM LEADER : WEISS, R APM-450 (202)267-8535 \*  
 WRITER/EDITOR :

OBJECTIVE: TO PROVIDE FOR RELIABLE COMMUNICATIONS IN ALL AREAS WHERE ROTORCRAFT OPERATE, WITH EMPHASIS ON IFR OPERATION SINCE COMMUNICATION IS A PREREQUISITE TO IFR OPERATIONS. TO DEVELOP SET OF TOOLS, TECHNIQUES, NEW CONCEPTS, NEW CAPABILITIES, AND SYSTEMS, AND TO ESTABLISH BASIS FOR IMPLEMENTATION. IMPROVEMENTS USING EXISTING VHF SYSTEM AND AVAILABLE EQUIPMENT, AND IMPROVEMENTS BASED ON NEW TECHNIQUES AND TECHNOLOGY (E.G., DATA LINK, SATELLITES).

REQUIREMENT: CONVENTIONAL VHF VOICE COMMUNICATION IS LIMITED TO LINE-OF-SIGHT; SERIOUS SHORTCOMINGS AT LOW ALTITUDES AND IN REMOTE AREAS. ALSO, DISSIMILARITIES BETWEEN ROTORCRAFT AND FIXED-WING AIRCRAFT AND ASSOCIATED OPERATIONS SHOULD BE ADDRESSED BY THE FAA. VOICE COMMUNICATIONS ARE REQUIRED AT LOW ALTITUDES NATIONWIDE. IN MANY AREAS, COVERAGE IS REQUIRED VIRTUALLY DOWN TO THE GROUND.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.	REVISED	ACTUAL
A/C EQUIP. SELECTION/INSTALL'N STUDY COMPL.	/ /		12/31/84
A/G SYS. IMPROVEMENT GUIDELINES COMPLETE	/ /		12/31/84
DATA LINK DEVELOPMENT STUDIES START	01/31/84	04/30/88	
DATA LINK DEVELOPMENT STUDIES COMPLETE	04/30/90		
SATELLITE COMMUNICATIONS DEV. STUDIES COMPL.	04/30/90		
REVIEW/IMPLEMENTATION OF SELECTED COMM SYS.	01/31/91		

STATUS: COST/BENEFIT ANALYSIS POINTS TO VHF COMMUNICATION AS THE MOST COST EFFECTIVE WAY TO PROVIDE THESE SERVICES. \*

REMARKS/NOTES: THIS EFFORT SUPPORTS ACTIVITIES IDENTIFIED IN RESUMES ATO-82-011-M, ATO-82-012-M, ATO-82-013-M, ATO-83-014-M, AND ATO-82-016-M.

PROJECT TITLE: ROTORCRAFT TRAFFIC-ALERT AND COLLISION AVOIDANCE  
 SYSTEM (TCAS)  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/18/87 LAST REVISION: 09/10/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: WALSH, JOSEPH, APM-330, (202) 267-8464  
 TEAM LEADER : SMITH, R APM-450 (202) 267-3783  
 WRITER/EDITOR :

OBJECTIVE: TO TAILOR THE TCAS LOGIC AND SURVEILLANCE TECHNIQUES TO MEET THE SPECIFIC REQUIREMENTS OF ROTORCRAFT. INCLUDES ALL ACTIVITIES NECESSARY TO DEFINE REQUIREMENTS FOR ROTORCRAFT USE OF TCAS, AND INVOLVES ANALYTICAL STUDIES, FLIGHT TESTS, AND RECOMMENDED CHANGES TO STANDARDS.

REQUIREMENT: UNIQUE NATURE OF ROTORCRAFT AND MANEUVERABILITY CHARACTERISTICS REQUIRES EVALUATION AND DEVELOPMENT OF SPECIAL TCAS PROVISIONS. REMOTE/LOW ALTITUDE OPERATIONS AND HIGH PROPORTION OF TIME SPENT IN VFR MAKES TCAS AN IMPORTANT ELEMENT OF SAFER ROTORCRAFT OPERATIONS IN VFR AND IFR.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
OPERATORS/USERS SURVEY	/ /		08/31/85
SURVEILLANCE STUDIES COMPLETE	11/30/83	12/31/86	12/31/86
LOGIC STUDIES COMPLETE	02/28/84	12/31/86	12/31/86
FLIGHT TESTS START	/ /		04/30/84
FLIGHT TESTS COMPLETE	11/30/84	01/31/86	12/31/86
REPORTS COMPLETE (DRAFT)	02/28/85	12/30/87	*
TCAS-I MOPS (FINAL DRAFT)	12/31/86		12/31/86*
RTCA MOPS APPROVED	/ /		03/20/87

STATUS: WITH THE PUBLICATION OF SEVERAL DRAFT REPORTS, WORK UNDER THIS RESUME WILL BE COMPLETE.

REMARKS/NOTES: IMPLEMENTATION DEPENDS ON USER PARTICIPATION AND EQUIPPAGE, SINCE FAA DOES NOT PLAN TO REQUIRE TCAS I EQUIPPAGE.

PROJECT TITLE: ROTORCRAFT LOW ALTITUDE SURVEILLANCE  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/18/87      LAST REVISION: 09/10/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: GOURNIC, JOHN, APM-210, (202) 267-8337  
 TEAM LEADER : SMITH, R      APM-450 (202) 267-3783  
 WRITER/EDITOR :

OBJECTIVE: TO PROVIDE FOR LOW ALTITUDE AIRCRAFT TRACKING, BELOW OR BEYOND RADAR COVERAGE, DEVELOPMENT OF A BASIC CONCEPT TO TRACK AIRCRAFT AT LOW ALTITUDES/REMOTE AREAS WITHOUT RADAR, USING INSTEAD NAVIGATION-BASED POSITION SENT TO ATC VIA DATA LINK. INVOLVES COOPERATIVE DEVELOPMENT, AND INTEGRATION WITH THE CURRENT AND FUTURE NAS COMPUTER SYSTEM. SECOND, TO DEVELOP LOW COST MODE S-BASED INTERROGATORS FOR USE AS GAP FILLERS TO AUGMENT THE SECONDARY SURVEILLANCE NETWORK.

REQUIREMENT: RADAR IS SUBJECT TO LINE-OF-SIGHT LIMITATIONS. WITHOUT RADAR, ATC MUST BE CONDUCTED PROCEDURALLY (MANUALLY). CONTROLLER WORKLOAD IS SUBSTANTIALLY INCREASED WITHOUT SURVEILLANCE. SURVEILLANCE IS REQUIRED AT LOW ALTITUDES NATIONWIDE. IN MANY AREAS, COVERAGE IS REQUIRED VIRTUALLY DOWN TO THE GROUND.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.      REVISED      ACTUAL		
LEASING PERIOD STARTS-NEW CONCEPT DEMO SYS.	/	/	02/28/84
CONTRACT AWARD FOR INTEGRATED SYSTEM	/	/	03/31/84
INSTALLATION AT HOUSTON-INTEGRATED SYSTEM	11/30/85	05/31/86	02/28/87
ACCEPTANCE/OPERATION OF INTEGRATED SYS.	02/28/86	06/30/87	04/30/87*
LOFF ACCURACY TESTING START	05/31/86	09/30/87	09/09/87*

STATUS: NO STATUS WAS PROVIDED.

REMARKS/NOTES: NAR TASK GROUP 1-3 CONCLUDED THAT RANDOM ROUTING SHOULD NOT BE IMPLEMENTED WITHOUT AIRCRAFT SURVEILLANCE. LOW ALTITUDE, SHORT-HAUL USERS HOWEVER, WOULD BE THE GREATEST BENEFICIARIES OFF RANDOM ROUTING. NAR TASK GROUPS 2-4 CONCLUDED THAT SUCH NONRADAR TECHNIQUES FOR TRACKING LOW ALTITUDE AIRCRAFT SHOULD BE INTEGRATED INTO THE EXISTING NAS ENROUTE SYSTEM, EVEN PRIOR TO THE ARRIVAL OF THE ADVANCED AUTOMATION SYSTEM. URBAN AREAS WITH HIGH LEVEL TRANSPONDER EQUIPPAGE DICTATE NEED FOR MODE S-BASED SUPPLEMENT TO THE RADAR SYSTEM. DEVELOPMENT AND DEMONSTRATIONS ARE BASED ON COOPERATIVE INDUSTRY/FAA EFFORT AND COMMITMENT. THIS EFFORT SUPPORTS ACTIVITIES IDENTIFIED IN RESUMES ATO-82-011-M, ATO-82-012-M, ATO-82-013-M, ATO-82-014-M, AND ATO-82-016-M.

PROJECT TITLE: ROTORCRAFT NAVIGATION/LANDING  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/18/87      LAST REVISION: 09/10/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: BILLMANN, BARRY, ACT-140, (609) 484-6508  
 TEAM LEADER : WEISS, R      APM-450 (609) 267-8535  
 WRITER/EDITOR :

OBJECTIVE: DEVELOP NEW ROTORCRAFT NAVIGATION AND LANDING CAPABILITIES FOR LOW ALTITUDE/REMOTE AREA OPERATIONS AND PROVIDE FOR CERTIFICATION OF NEW NAVIGATION/LANDING SYSTEMS. ALL ACTIVITIES TO PROVIDE FOR GREATER ROTORCRAFT NAVIGATION AND LANDING CAPABILITIES AND FOR THE CERTIFICATION OF SUCH SYSTEMS. EQUIPMENT/SYSTEM DEVELOPMENT, FLIGHT TEST, DEVELOPMENT OF SYSTEMS CERTIFICATION TOOLS AND TECHNIQUES.

REQUIREMENT: HELICOPTERS OPERATE AT LOW ALTITUDE WHERE VOR/DME OFTEN IS NOT AVAILABLE. LOW ALTITUDE NAVIGATION COVERAGE IS REQUIRED NATIONWIDE AT ALTITUDES DOWN TO THE GROUND. LOW TRAFFIC DENSITIES DICTATE NEED FOR ELIMINATION OF COSTLY GROUND EQUIPMENT. HELIPORT MLS NEEDED AT HIGHER DENSITY AREAS. ADVANCED SYSTEMS DISPLAYS SHOULD RESULT IN APPROVAL OF GREATER PRIVILEGES; HOWEVER, CERTIFICATION CRITERIA ARE NEEDED.

MILESTONE SCHEDULE	COMPLETION DATES:	SCHED.	REVISED	ACTUAL
ZERO/ZERO LANDING ISSUES-CONTRACT AWARD		01/31/87		08/30/86
ZERO/ZERO LANDING ISSUE DEFINED		02/28/88		
LORAN-C NONPRECISION APPROACH (PILOT PROJECT)		10/31/87		
LORAN-C 1ST PRODUCTION MONITOR INSTALLED		06/30/88		
LORAN-C MID-CONTINENTAL TRANSMITTERS INST.		01/31/89	12/31/89	
BASIC MLS FOR HELIPORTS START		/ /		09/30/83
BASIC MLS FOR HELIPORTS COMPLETE		12/31/86		12/31/86*

STATUS: WORK ON GPS HAS BEEN DELAYED DUE TO A LACK OF FUNDING.

REMARKS/NOTES: COOPERATIVE EFFORTS WITH OTHER GOVERNMENT AGENCIES. MLS IS REQUIRED FOR FAA TECHNICAL CENTER. THIS EFFORT SUPPORTS ACTIVITIES IDENTIFIED IN RESUMES ATO-82-011-M, ATO-82-012-M, ATO-82-013-M, ATO-82-014-M, AND ATO-82-016-M.

AVS RESUME

ADL-82-080-M

PROJECT TITLE: HELIPORT PLANNING AND DESIGN CRITERIA  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/18/87      LAST REVISION: 09/10/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: BILLMANN, BARRY, ACT-140, (609) 484-6608  
 TEAM LEADER : SMITH, R      APM-450      (202) 267-3783  
 WRITER/EDITOR :

OBJECTIVE: DEVELOP CRITERIA FOR HELIPORT DESIGN STANDARDS AND DATA TO SUPPORT PREPARATION OF HELIPORT PLANNING GUIDE. INCLUDES ALL ACTIVITIES, WITH THE EXCEPTION OF NOISE, REQUIRED TO DEVELOP TECHNICAL INFORMATION ULTIMATELY APPEARING IN DESIGN AND PLANNING GUIDES. CONDUCT ENGINEERING STUDIES AND FLIGHT TESTS TO DEVELOP AND VALIDATE CRITERIA TO PROVIDE RESULTS TO THE OFFICE OF AIRPORTS FOR INPUT TO GUIDES, AND TO THE OFFICE OF AVIATION STANDARDS FOR PREPARATION OF STANDARDS AND PROCEDURES.

REQUIREMENT: THE EXISTING HELIPORT DESIGN GUIDE REQUIRES REFINEMENT AND ADDITIONAL INFORMATION CONCERNING ALL-WEATHER DESIGN. ALSO, NO HELIPORT PLANNING GUIDE EXISTS TODAY. HELIPORT GROWTH WILL BE A KEY TO CONTINUED INDUSTRY GROWTH. OF 4,000 HELIPORTS TODAY, LESS THAN 10% ARE PUBLIC USE AND NONE POSSESS A TRUE ALL-WEATHER CAPABILITY.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.      REVISED      ACTUAL		
START ALL-WX HELIPORT DESIGN INFO. PREP.	/	/	08/31/83
LOAD DEFINITION ANALYSIS COMPLETE	/	/	09/30/84
OTHER ALL-WX HELIPORT REQUIREMENTS	/	/	12/31/85      12/31/85
PRELIMINARY IFR LIGHTING RECOMMENDATION	/	/	06/30/84
SIMUL. TESTS OF HELIP. APPROACH LIGHT SYSTEMS	/	/	10/30/86
HELIPORT MANEUVERING AREA REPORT	09/30/88		*
HELIPORT/HELICOPTER CLASSIFICATION RECS.	12/30/88		*
HELIPORT PLANNING RECOMMENDATIONS	12/30/88		*
VFR APPROACH AND DEPARTURE AIRSPACE REPORT	10/30/89		*

STATUS: NONE.

REMARKS/NOTES: FAA CRITERIA, STANDARDS, AND GUIDELINES WILL BE ESTABLISHED FOR ALL-WEATHER HELIPORTS. HOWEVER, THE INDUSTRY MUST CONTINUE TO WORK WITH THE COMMUNITIES IN ORDER TO ACHIEVE GREATER PUBLIC ACCEPTANCE OF HELIPORTS AND HELICOPTER OPERATIONS. THIS EFFORT SUPPORTS ACTIVITIES IDENTIFIED IN RESUMES ARP-82-010-M, ARP-82-020-M, AND ARP-83-030-M.

PROJECT TITLE: ROTORCRAFT AIRWORTHINESS AND FLYING QUALITIES  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/18/87 LAST REVISION: 09/10/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: TRAYBAP, JOSEPH, (ACT-330), (609) 484-4280  
 TEAM LEADER : CAIAFA, C ACT-330 (609) 484-4284  
 WRITER/EDITOR :

OBJECTIVE: CONDUCT FLIGHT TEST TYPE ANALYSES AND DEVELOP PERTINENT DATA AND INFORMATION RELATED TO FLYING QUALITIES ASSESSMENT/AIRWORTHINESS EVALUATIONS/TESTING GUIDELINES REQUIRED TO SUPPORT CERTIFICATION PERSONNEL IN THEIR ASSESSMENT PROCEDURES AND SAFETY COMPLIANCE ASSURANCE OF ADVANCED ROTORCRAFT AND SYSTEMS. PARTICIPATE IN THE EXISTING JOINT AGREEMENT FLIGHT-TEST PROGRAM (BETWEEN THE FAA AND THE NATIONAL RESEARCH COUNCIL CANADA, NRC) THAT FOCUSES ON GROUND/IN-FLIGHT HELICOPTER STUDIES NEEDED TO ACCOMPLISH THE COORDINATED MUTUAL INTERESTS AND GOALS OF BOTH COUNTRIES. THE WORK CONCENTRATES ON IMPROVING AND UPDATING FLIGHT-TEST GUIDANCE MATERIAL AND TESTING PROCEDURES RELATED TO INCREASING THE OVERALL UTILITY AND COST EFFECTIVENESS OF THE ROTORCRAFT FLEET AND EXTENDING THAT PORTION OF THE AIRCRAFT FLIGHT ENVELOPE AVAILABLE FOR HIGH PERFORMANCE INSTRUMENT APPROACHES TO HELIPORTS.

REQUIREMENT: PROVIDE DATA AND INFORMATION THAT IMPROVES THE TESTING AND ASSESSMENT OF ROTORCRAFT AND PROVIDES SUPPORT TO THE TEST PILOTS, AIRWORTHINESS SPECIALISTS, AND REGULATORY PERSONNEL EVALUATING ADVANCED ROTORCRAFT FLIGHT CONTROL AND PERTINENT NEW TECHNOLOGY APPLICATIONS. THE INCREASING USE OF ROTORCRAFT FOR SPECIALIZED MISSIONS AND HIGHER PERFORMANCE INSTRUMENT OPERATIONS AT HELIPORTS PLACED CRITICAL DEMANDS ON THE\*

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.	REVISED	ACTUAL
DEVELOPED PRIORITIZED TEST PLAN (ASW/ACT)	04/30/87		04/30/87
COUPLED/CROSSWIND COLLECTIVE TESTS PHASE I	09/30/87		*
COUPLED/CROSSWIND COLLECTIVE TESTS PHASE II	06/30/88		*
REPORT	12/30/88		*
DECELERATING APPROACH TESTS PHASE I	06/30/89		*
DECELERATING APPROACH TESTS PHASE II	10/30/89		*
REPORT	03/31/90		*
INTER-AXIS COUPLING TESTS PHASE I	06/30/90		*
INTX -AXIS COUPLING TESTS PHASE II	10/30/90		
REPORT	03/31/91		

STATUS: PROGRAM PRIORITIES COORDINATED BETWEEN ACT-330 AND PARTICIPATING ASW/ANE PERSONNEL. ALL MANAGEMENT/FINANCIAL DOCUMENTS BETWEEN FAA/NRC UPDATED AS NEEDED FOR NEW FOLLOW-ON ANNEX PHASE OF PROGRAM.

REMARKS/NOTES: THIS EFFORT SUPPORTS ACTIVITIES IDENTIFIED IN RESUMES AVS-85-202-M AND AVS-85-203-M.

\*AIRCRAFT/AIRCREW SYSTEM WHEREBY ADVANCED CONTROLS/DISPLAYS/SYSTEMS PLAY AN INCREASING ROLE ON IMPROVING PILOT WORKLOAD LEVEL WHILE AUGMENTING OVERALL SYSTEM SAFETY AND COST EFFECTIVENESS.

AVS RESUME

ADL-82-100-M

PROJECT TITLE: ROTORCRAFT ICING  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/19/87      LAST REVISION: 05/26/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: MASTERS, CHARLES, ACT-340, (609) 484-4147 \*  
 TEAM LEADER : REED, J      ACT-340 (609) 484-4135  
 WRITER/EDITOR :

OBJECTIVE: DEFINE THE FLIGHT HAZARDS ASSOCIATED WITH ENVIRONMENTAL ICING. ESTABLISH A DATA BASE DELINEATING SPECIFICATIONS AND CRITERIA WHICH CAN BE USED BY THE AIRWORTHINESS SPECIALISTS DURING THE CERTIFICATION PROCESS. DEVELOP SCALING LAWS, AND SIMULATION AND ANALYTICAL TECHNIQUES WHICH CAN BE USED DURING THE CERTIFICATION PROCESS.

REQUIREMENT: EXPANDED ROTORCRAFT IMC OPERATIONS INCREASE THE POTENTIAL FOR FLIGHT INTO KNOWN ICING CONDITIONS. CERTIFICATION AUTHORITIES AND HELICOPTER MANUFACTURERS NEED NEW/REVISED ATMOSPHERIC ICING CRITERIA AND GUIDELINES WHICH INCLUDE ANALYTICAL AND SIMULATION TECHNIQUES AND VALIDATION TESTING IN CERTIFICATION.

MILESTONE SCHEDULE	COMPLETION DATES:		
	SCHED.	REVISED	ACTUAL
ATMOSPHERIC CHARAC. OF SUPERCOOLED CLOUDS	12/31/88	12/31/89	
ATMOSPHERIC CHARAC. OF SNOW, FREEZING RAIN	12/31/88	12/31/89	
ATMOS. CHARAC. OF ICE CYRSTALS, MIXED COND.	12/31/90	12/31/89	
AIRCRAFT ICING HANDBOOK	06/30/87	03/30/88	
SIMULATION IN CERTIFICATION (RATIONALE)	03/31/86		03/31/86
ICING INSTRUMENTATION CALIBRATION STDS.	10/31/88		
DEV. DATE FOR SNOW SIMULATION AC	/ /		05/31/84
GROUND DEICING TECHNOLOGY	12/31/85	04/30/86	03/31/86

STATUS: ATMOSPHERIC CHARACTERIZATIONS OF SUPERCOOLED FOG ARE IN THE PLANNING STAGES.

REMARKS/NOTES: THIS EFFORT SUPPORTS ACTIVITIES OUTLINED IN RESUME AVS-81-150-M.

PROJECT TITLE: ROTORCRAFT CRASHWORTHINESS/STRUCTURAL AIRWORTHINESS  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/19/87      LAST REVISION: 05/26/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: NERI, LAWRENCE, ACT-330, (609) 484-4459 \*  
 TEAM LEADER : CAIAFA , C      ACT-330      (609) 484-4284  
 WRITER/EDITOR :

OBJECTIVE: TO ENHANCE OCCUPANT SURVIVABILITY THROUGH STRUCTURAL AND CABIN DESIGN, AND FUEL SYSTEM INTEGRITY. DEFINE SURVIVABLE CRASH ENVIRONMENT, DEVELOP/EVALUATE AIRFRAME CONCEPTS, DEVELOP CABIN SAFETY CONCEPTS, EVALUATE/VALIDATE CRASH RESISTANT FUEL SYSTEMS, AND DEVELOP/VALIDATE EMERGENCY EGRESS CONCEPTS. CONDUCT THE APPROPRIATE RESEARCH IN SUPPORT OF INDICATED GOALS. DETERMINE OPTIONAL MIX OF CRASHWORTHINESS MEASURES FOR CONSIDERATION IN IMPROVEMENTS TO AIRCRAFT CERTIFICATION CRITERIA. \*

REQUIREMENT: ROTORCRAFT MANUFACTURERS AND CERTIFICATION AUTHORITIES NEED IMPROVED CRITERIA AND STANDARDS ADDRESSING CRASHWORTHY DESIGN FEATURES IN AN EFFORT TO MAXIMIZE OCCUPANCY AND CREW SURVIVABILITY IN THE EVENT OF A CRASH.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.      REVISED      ACTUAL		
CRASH ENVIRONMENT DEFINITION	/	/	09/30/83
COMPOSITE AIRFRAME IMPACT DYNAMICS	09/30/87		
AIRFRAME CONCEPTS	07/31/85	08/31/88	
CABIN SAFETY	12/31/85	02/28/88	
FUEL CONTAINMENT	06/30/86	03/31/88	
EMERGENCY EGRESS	12/31/86	05/31/88	
SYSTEM ECONOMIC ANALYSIS	12/31/87		

STATUS: EFFORTS ARE ONGOING TO INVESTIGATE ROTORCRAFT CRASHWORTHY AIRFRAME CONCEPTS AND TO PRESCRIBE HOW EXISTING FUEL CONTAINMENT TECHNOLOGY MAY BE DIRECTLY TRANSFERRED FROM THE MILITARY TO THE CIVIL FLEET IN A COST-EFFECTIVE MANNER. \*

REMARKS/NOTES: THE ROTORCRAFT CRASHWORTHINESS PROGRAM IS A GENERIC CRASHWORTHINESS PROGRAM IN CONCERT WITH NASA, AND U.S. NAVY. USES INTERAGENCY AGREEMENTS, COMPETITIVE CONTRACTS, AND IN-HOUSE RESOURCES TO THE GREATEST EXTENT PRACTICAL. THE INCREASED USE OF ADVANCED TECHNOLOGY MATERIALS IN AIRFRAME STRUCTURE HAS DICTATED CERTIFICATION STANDARDS TO BE REVISITED. \*

AVS RESUME

ADL-83-120-M

PROJECT TITLE: ROTORCRAFT OBSTRUCTION AVOIDANCE  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/19/87 LAST REVISION: 09/10/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: TRAYBAR, JOSEPH, ACT-330, (609) 484-4286  
 TEAM LEADER : SMITH, R APM-450 (202) 267-3783  
 WRITER/EDITOR :

OBJECTIVE: ENHANCE SAFETY OF LOW ALTITUDE OPERATIONS THROUGH A COMPREHENSIVE SYSTEMS APPROACH TO OBSTRUCTION AVOIDANCE. EMPHASIS WILL BE PLACED ON THE EVALUATION AND IMPROVEMENT OF OPERATIONAL PROCEDURES, OBSTRUCTION MARKING/LIGHTING TECHNIQUES, OBSTRUCTION DETECTION SYSTEMS, AND OBSTRUCTION PROTECTION SYSTEMS.--AIR AMBULANCE HELICOPTER OPERATIONS ARE \* OF PARTICULAR INTEREST. \*

REQUIREMENT: COLLISIONS WITH OBSTRUCTIONS, PARTICULARLY WIRES, ARE RESPONSIBLE FOR A SIGNIFICANT NUMBER OF LOW ALTITUDE INJURIES AND FATALITIES EACH YEAR. A NUMBER OF MEASURES CAN BE TAKEN AGAINST THESE HAZARDS TO IMPROVE THE SAFETY OF LOW ALTITUDE OPERATIONS. SUPPORT GUIDANCE MATERIAL/CERTIFICATION PROCEDURES FOR AIRBORNE EQUIPMENT IS REQUIRED.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
OBSTRUCTION AVOIDANCE ACCIDENT/INCIDENT ANAL.	10/31/84	03/31/87	09/30/86
DEVELOP A DRAFT PROJECT PLAN	06/30/87		06/30/87*
PHASE I, ANALYSIS	03/31/88	10/30/89	
PHASE II, SIMULATION TESTING	02/28/91		
PHASE III, FLIGHT TESTING	03/30/92		

STATUS: THE SCOPE OF THIS PROJECT WILL BE REEVALUATED BASED ON AN FAA REVIEW OF THE DRAFT PROJECT PLAN. \*

REMARKS/NOTES: THIS EFFORT SUPPORTS ACTIVITIES IDENTIFIED IN RESUME ATO-82-051-W.

PROJECT TITLE: ROTORCRAFT ATMOSPHERIC ELECTRICAL HAZARDS  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/19/87 LAST REVISION: 09/10/87 REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: REED, JOHN, ACT-340, (609) 484-4135  
 TEAM LEADER :  
 WRITER/EDITOR :

OBJECTIVE: THIS RESEARCH EFFORT WILL ESTABLISH THE LIGHTNING CHARACTERIZATION MODEL, LIGHTNING STRIKE ZONES, SIMULATION TECHNIQUES, ANALYTICAL MODELS, ALGORITHMS, AND DEFINE ACCEPTABLE CERTIFICATION STANDARDS. CERTIFICATION VALIDATION PROCESS ACCEPTABLE USING BOTH ANALYTICAL AND SIMULATION TECHNIQUES WILL BE ESTABLISHED.

REQUIREMENT: THE IMPACT OF ELECTRICAL HAZARDS SUCH AS LIGHTNING, STATIC DISCHARGE PHENOMENON, ELECTRICAL DISCHARGE, AND AIRCRAFT GENERATED ELECTROMAGNETIC INTERFERENCE (EMI) ON COMPOSITE HELICOPTER STRUCTURES AND SYSTEMS USING DIGITAL ELECTRONICS, PRESENTS SAFETY ISSUES WHICH MUST BE ADDRESSED.

MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
LIGHTNING HAZARD MODEL AND STRIKE ZONE	06/30/88	10/30/88	
COMPOSITE/ELECTRICAL PROPERTIES	02/28/86	07/30/87	07/30/87*
LIGHTNING PROTECTION HANDBOOK	09/30/87	12/30/87	
LIGHTNING SIMULATION TECHNIQUES	08/31/87	10/30/87	
SOFTWARE RELIABILITY ASSESSMENT	01/31/89		12/17/86
LATENT FAULT MEASUREMENTS	02/28/86		12/30/86
BUS INTEGRITY	04/30/86		03/30/87
DIGITAL SYSTEMS VALIDATION HANDBOOK	04/30/88	06/30/89	

STATUS: THE ATMOSPHERIC ELECTRICAL HAZARDS ARE GENERIC, THEREFORE, THIS PROGRAM CAPITALIZES ON PAST, ONGOING, AND FUTURE RESEARCH AND IN AN EFFORT TO COALESCE RESOURCES, PARTICIPATION AS AN ACTIVE MEMBER OF THE NATIONAL INTERAGENCY COORDINATION GROUP FOR LIGHTNING PROTECTION OF AIRCRAFT.

REMARKS/NOTES: ELECTROMAGNETICALLY, THE ROTORCRAFT IS A VERY COMPLEX VEHICLE AND DOES NOT EASILY LEND ITSELF TO PREDICTIONS OF INDUCED ELECTRICAL EFFECTS.

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 PROJECT TITLE: SIMULATOR VALIDATION  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS  
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RESUME DATE: 03/19/87 LAST REVISION: 09/10/87 REACTIVATED:

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 STAFF: PRINCIPAL SPECIALIST: BOOTHE, EDWARD, ASO-205, (404) 763-7773  
 TEAM LEADER : WEISS, R APM-450 (202) 267-8535 \*  
 WRITER/EDITOR :

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 OBJECTIVE: THIS PROJECT WILL ESTABLISH THE NECESSARY CRITERIA  
 AND GUIDANCE MATERIAL TO PERMIT FAA CERTIFICATION OF HELICOPTER  
 SIMULATORS WHICH CAN BE USED FOR HELICOPTER PILOT CERTIFICATES AND  
 ASSOCIATED TYPE RATINGS.  
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REQUIREMENT: THE AGENCY DOES NOT RECOGNIZE HELICOPTER SIMULATORS AS A  
 SUBSTITUTE FOR THE AIRCRAFT IN CONDUCTING AIRMAN CERTIFICATION. IN ORDER FOR  
 THE FAA TO GIVE PILOT TRAINING AND CHECKING CREDITS FOR TIME IN A HELICOPTER  
 SIMULATOR, THE SIMULATOR MUST BE FAA-VALIDATED TO A MINIMUM ACCEPTABLE  
 PERFORMANCE CRITERIA.  
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MILESTONE SCHEDULE	COMPLETION DATES: SCHED. REVISED ACTUAL		
VISUAL SCENE PERFORMANCE	09/30/87	03/30/89	
MOTION SYSTEM PERFORMANCE	06/30/86	03/30/89	
MODELS AND ALGORITHMS	09/30/87	03/30/89	

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 STATUS: THIS PROJECT WAS DELAYED DUE TO A LACK OF FUNDING.  
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REMARKS/NOTES: THIS EFFORT SUPPORTS ACTIVITIES OUTLINED IN RESUMES  
 AVS-83-050-X AND AVS-83-051-X. THIS PROJECT WILL BE ACCOMPLISHED AT  
 NASA-AMES.  
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PROJECT TITLE: ROTORCRAFT HUMAN BEHAVIOR  
 PROJECT CATEGORY: ROTORCRAFT MASTER PLAN DEVELOPMENT AND LOGISTICS PROGRAMS

RESUME DATE: 03/19/87      LAST REVISION: 09/11/87      REACTIVATED:

STAFF: PRINCIPAL SPECIALIST: HWOSCHINSKY, PETER, APM-450, (202) 267-8531  
 TEAM LEADER : WEISS, R      APM-450      (202) 267-8535  
 WRITER/EDITOR :

OBJECTIVE: TO ESTABLISH A DATA BASE FOR ASSESSING AND STANDARDIZING ROTORCRAFT DISPLAYS AND CONTROLS. THIS INFORMATION WILL ESTABLISH THE RELATIONSHIP BETWEEN FATIGUE, STRESS, AND ROTORCRAFT COCKPIT DESIGN, (VISIBILITY REQUIREMENTS WILL BE INCLUDED). IN ADDITION, AERONAUTICAL DECISIONMAKING (ADM) CONCEPTS WHICH HAVE BEEN DEVELOPED AND APPLIED TO FIXED-WING TRAINING SHALL BE MODIFIED FOR APPLICATION TO ROTORCRAFT TRAINING IN AN EFFORT TO REDUCE THE NUMBER OF PILOT-ERROR ACCIDENTS.

REQUIREMENT: THE USE OF ROTORCRAFT HAS CHANGED DRASTICALLY IN SPECIFIC AREAS AND THE AGENCY HAS A PRESSING NEED TO ESTABLISH ACCEPTABLE STANDARDS FOR DISPLAY CONTROLS AND CREW DUTY TIME. ALSO, ROTORCRAFT DECISIONMAKING TRAINING MUST BE ESTABLISHED AND DOCUMENTED (PARITY WITH FIXED-WING AIRCRAFT).

MILESTONE SCHEDULE	COMPLETION DATES: SCHED.    REVISED    ACTUAL		
ADM. MANUAL FOR ROTORCRAFT PILOTS	08/31/86		03/31/87
ADM. MAN. FOR AIR AMBULANCE ROTORCRAFT PILOTS	08/30/88		*
ROTORCRAFT DISPLAY AND CONTROL STANDARD	12/31/83		
PILOT VISIBILITY CRITERIA	12/31/83		
ROTORCRAFT FATIGUE AND STRESS	03/31/89		

STATUS: THE PROGRAM REQUIREMENTS AND INVESTIGATIVE PROCESS HAVE BEEN DELINEATED AND INCORPORATED INTO AN AVIATION BEHAVIORAL TECHNOLOGY PROGRAM. COCKPIT HUMAN FACTORS RESEARCH PLAN.

REMARKS/NOTES: THIS EFFORT SUPPORTS ACTIVITIES IDENTIFIED IN RESUME AVS-83-141-M.